

CP400 Series Commercial/Industrial Pressure Loaded Pressure Reducing Regulators

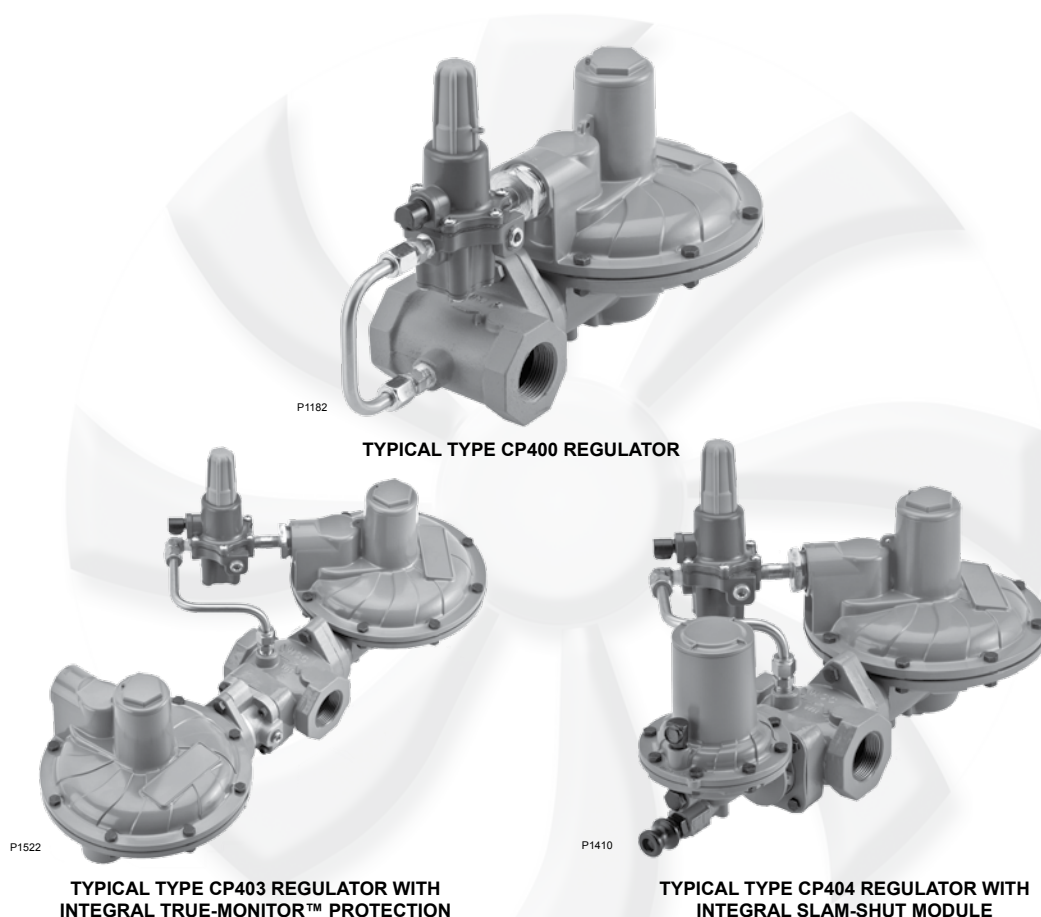


Figure 1. CP400 Series Pressure Loaded Pressure Reducing Regulator

Features and Benefits

- Wide Variety of Body Sizes and End Connections
- Fixed Factor/Pressure Factor Measurement (PFM) Accuracy Capabilities
- Field Convertible from Internal Sensing for Wide-Open Monitor Construction
- Multiple Overpressure Protection Options
- Available in Gray Cast Iron, Ductile Iron and Steel Body Materials
- Only Standard Tools Required for Pressure Adjustment and Orifice Removal
- Easy to Maintain



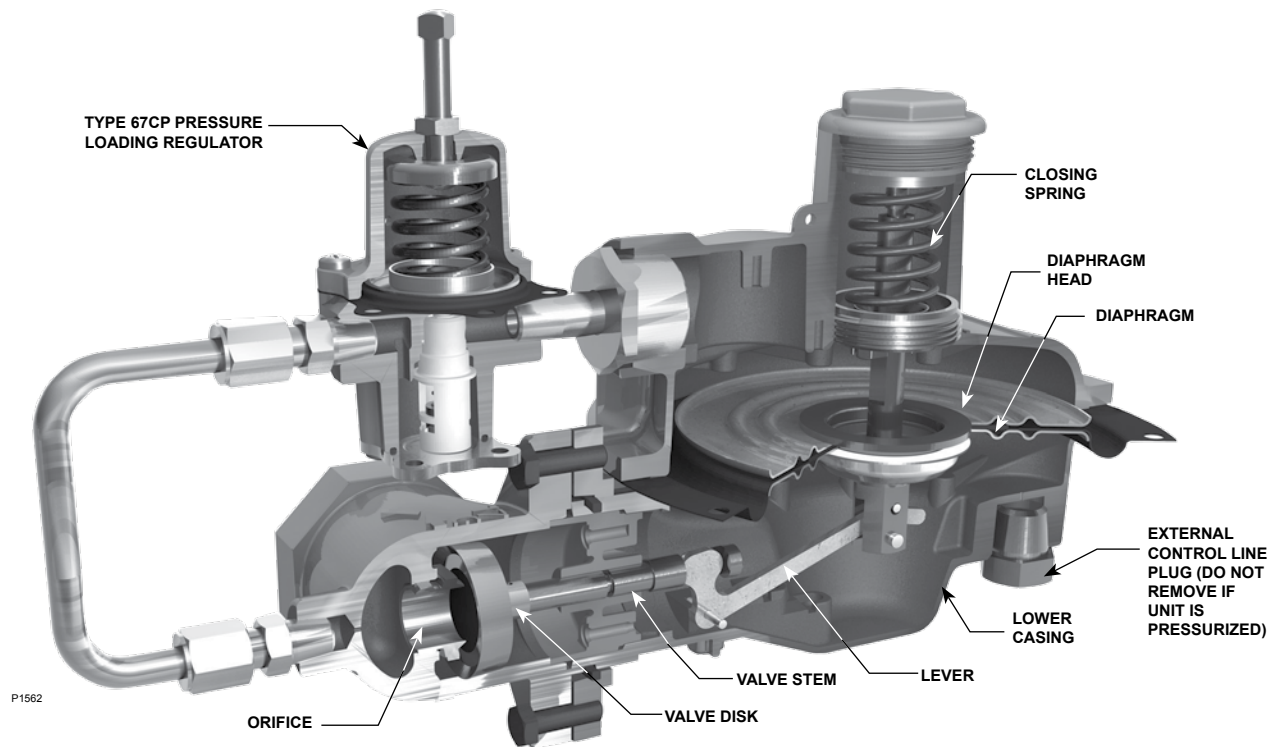


Figure 2. Typical CP400 Regulator Cut-away View

Introduction

The CP400 Series pressure loaded regulators have been engineered to fit a multitude of pressure-reducing applications including light industrial and commercial installations, which include accurate control for use in pressure-factor measurement (fixed factor billing) applications. This flexibility is provided by the numerous body end connection sizes, body materials, outlet pressure settings, orifice sizes, as well as the option for internal or external pressure registration. In addition to application flexibility, the CP400 Series offers multiple overpressure protection options to meet your demands on application requirements.

Overpressure Protection Options Available:

- **Token Relief** – Provides a small capacity or token relief located in the Type 67CPR loading regulator that relieves minor overpressure caused by thermal expansion or minor nicks in the orifice or disk.
- **True-Monitor™ Protection** – Combines the operation of a conventional two regulator wide-open monitor set into one body. Provides a second monitoring regulator to control downstream pressure. In the event of failure of the primary regulator due to damage to the lever, downstream sense line, orifice, disk, diaphragm, etc., the monitoring regulator will assume control of the downstream pressure and regulator flow.
- **Slam-Shut Protection** – Discontinues gas service by shutting the gas off if there is an overpressure or underpressure condition.

Specifications

Available Configurations

Type CP400IN: Type CP400 with INTERNAL pressure registration and NON-RELIEVING construction
Type CP400IT: Type CP400 with INTERNAL pressure registration and TOKEN relief
Type CP400EN: Type CP400 with EXTERNAL pressure registration and NON-RELIEVING construction
Type CP400ET: Type CP400 with EXTERNAL pressure registration and with TOKEN relief
Type CP403IN: Type CP400IN with integral TRUE-MONITOR™ Protection
Type CP403IT: Type CP400IT with integral TRUE-MONITOR Protection
Type CP403EN: Type CP400EN with integral TRUE-MONITOR Protection
Type CP403ET: Type CP400ET with integral TRUE-MONITOR Protection
Type CP404IN: Type CP400IN with integral Type VSX4 Slam-shut module
Type CP404IT: Type CP400IT with integral Type VSX4 Slam-shut module
Type CP404EN: Type CP400EN with integral Type VSX4 Slam-shut module
Type CP404ET: Type CP400ET with integral Type VSX4 Slam-shut module
 See Table 1

Body Sizes, Material, End Connections and Pressure Rating⁽¹⁾

See Table 2

Inlet Pressure Ratings⁽¹⁾

See Table 3

Maximum Outlet Pressures⁽¹⁾

See Table 4

Outlet Pressure Ranges⁽¹⁾

See Table 5

Token Relief Start-to-Discharge

See Table 11

Flow Capacities

Type CP400

See Tables 12 through 17, 20 through 25

Types CP403 and CP404

See Tables 18, 19, 26 and 27

Type CP400 for Pressure Factor Measurement (PFM) Applications

See Tables 29 through 34

Temperature Capabilities⁽¹⁾⁽²⁾

-20 to 150°F / -29 to 66°C

Spring Case Vent and Body Orientation

See Figure 7

Construction Materials

CP400 Series Main Valve and Actuator

Body: Gray Cast Iron, Ductile Iron and Steel

Body O-ring: Nitrile (NBR)

Closing Cap: Aluminum

Adjusting Screw: Aluminum

Diaphragm Case, Spring Case, Diaphragm Plate and Valve Stem: Aluminum

Diaphragm Plate: Steel

Orifice: Aluminum

Pusher Post: Aluminum

Diaphragm and Disk: Nitrile (NBR)

Relief Valve Seat: Aluminum

Control Spring: Stainless steel

Relief Valve Stem: Aluminum

Diaphragm Retainer: Zinc-plated steel

Lever Pin: Stainless steel

Spring Seat: Aluminum

Lever: Steel

67CP Series Pressure Loading Regulator

Spring: Music wire or Stainless steel

Body: Aluminum

O-ring and Soft Seat: Nitrile (NBR)

Valve Stem: Aluminum

Valve Plug: Nitrile (NBR)

Diaphragm: Nitrile (NBR)

True-Monitor Actuator

Diaphragm Case, Spring Case, Upper Retainer, Monitor Housing and Valve Stem: Aluminum

Diaphragm Plate, Middle Diaphragm Retainer and Low Disk Retainer: Steel

Diaphragm and Disk: Nitrile (NBR)

Control Spring: Stainless steel

Disk Housing: Brass

Vent Screen: Stainless steel

Vent Screen Retainer: Stainless steel

Closing Cap: Aluminum

Adjusting Screw: Aluminum

Type VSX4 Slam-Shut Device

Diaphragm Case, Spring Case, Diaphragm Plate and Valve Stem: Aluminum

Diaphragm and Disk: Nitrile (NBR)

Control Spring: Stainless steel

Vent Screen: Stainless steel

Vent Screen Retainer: Zinc-plated steel

Closing Cap: Aluminum

Adjusting Screw: Aluminum

1. The pressure/temperature limits in this Bulletin or any applicable standard limitation should not be exceeded.

2. Product has passed Fisher® testing for lockup, relief start-to-discharge and reseal down to -40 degrees.

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Specifications (continued)

Approximate Weights

With threaded body

Type CP400: 11 lbs / 5 kg

Type CP403: 20.5 lbs / 9 kg

Type CP404: 13.2 lbs / 6 kg

Approximate Weights (continued)

Add 8.6 lbs / 4 kg to weights listed with flanged body

Designed, Tested and Evaluated Consistent with:

ASME B16, ASME Section VIII DIV I, ASTM B117
(Corrosion Resistance)

Table 1. Available Configurations

TYPE NUMBER					OPTIONS	
C	P	4	0			
					OVERPRESSURE PROTECTION MODULE	
				0	Without Overpressure Protection Module	
				3	With Integral Monitor Module ⁽¹⁾	
				4	With Slam-shut Module ⁽²⁾	
					PRESSURE REGISTRATION	
				E	External Registration	
				I	Internal Registration	
					RELIEF	
				N	Non-Relief	
				T	Token Internal Relief	
					Example: Type number CP404IT: CP400 Series regulator constructed with Type VSX4 Slam-shut module, with Internal pressure registration and with Token relief.	
					1. Reference Instruction Manual D103126X012 for information regarding the Integral Monitor module.	
					2. Reference Instruction Manual D103127X012 for information regarding the Type VSX4 safety shutoff module.	

Table 2. Body Sizes, Materials, End Connections and Pressure Ratings

TYPE	BODY MATERIAL	BODY SIZE	END CONNECTION	FACE-TO-FACE DIMENSION		PRESSURE RATING	
				In.	mm	psig	bar
CP400	Gray Cast Iron	1-1/4	NPT	4.5	114	175	12.1
		1-1/2					
		2		5	127		
		NPS 2 / DN 50	CL125 FF	10	254		
CP400, CP403 and CP404	Ductile Iron	1-1/4	NPT	4.5	114	290	20.0
		1-1/2					
		2		5	127		
		1-1/4	Rp	4.5	114		
		1-1/2					
		2		5	127		
		NPS 2 / DN 50	CL125 FF / CL150 FF	10	254		
		NPS 2 / DN 50	PN 10/16			232	16.0
	Steel	1-1/4	NPT	4.5	114	290	20.0
		1-1/2					
		1-1/4	Rp	7.5	191		
		1-1/2		10	254		

Table 3. Inlet Pressure Ratings and Flow and Sizing Coefficients

ORIFICE SIZE		MAXIMUM OPERATING INLET PRESSURE		WIDE-OPEN FLOW COEFFICIENTS		C _i	IEC SIZING COEFFICIENTS		
In.	mm	psig	bar	C _g	C _v		X _T	F _D	F _L
3/16	4.8	125	8.6	27	0.97	27.7	0.50	0.91	0.89
1/4	6.4	125	8.6	50	1.77	28.2	0.50	0.92	
3/8	9.5	80	5.5	113	3.72	30.4	0.58	0.89	
1/2	13	60	4.1	182	5.61	32.4	0.66	0.82	
5/8	16	50	3.4	284	7.26	39.1	0.97	0.74	
3/4	19	40	2.8	356	9.83	36.2	0.83	0.72	

Table 4. Maximum Outlet Pressures

TYPE	EMERGENCY OUTLET PRESSURE (CASING)	MAXIMUM OUTLET PRESSURE TO AVOID INTERNAL PARTS DAMAGE	MAXIMUM OPERATING OUTLET PRESSURE
CP400 and CP404	25 psig / 1.7 bar	25 psig / 1.7 bar	20 psig / 1.4 bar
CP403	25 psig / 1.7 bar	5 psi / 0.34 bar over setpoint	7.5 psig / 0.52 bar

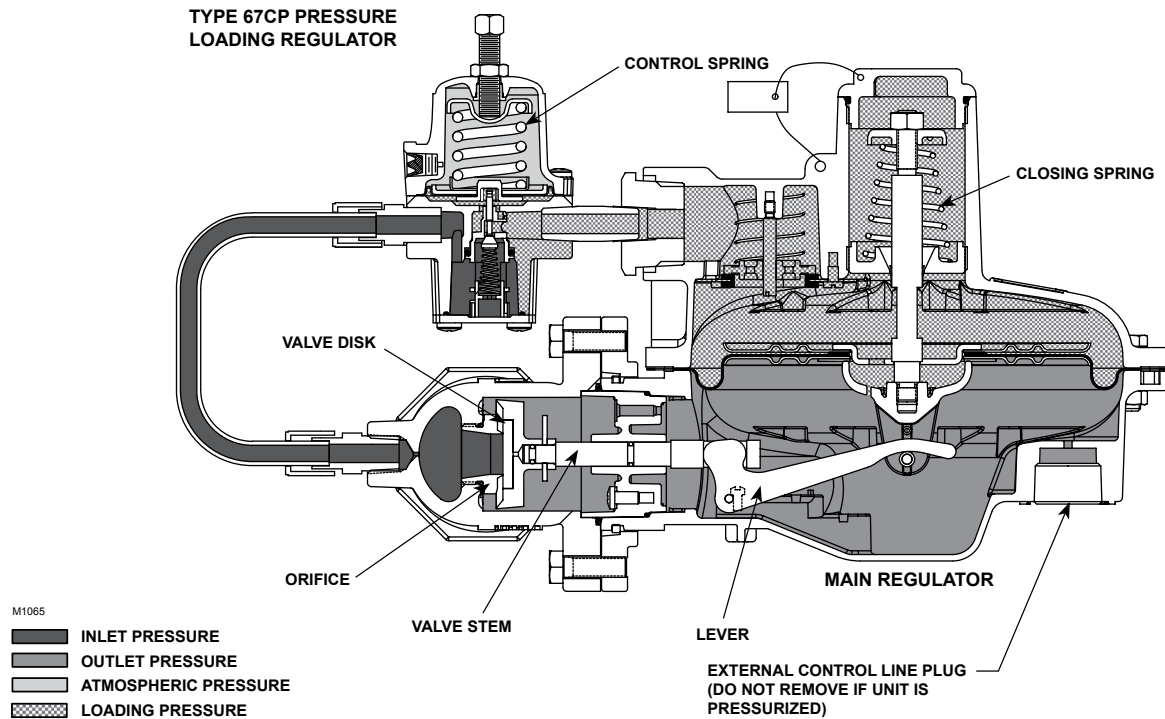


Figure 3. Type CP400IN Pressure Loaded Regulator with Internal Pressure Registration Operational Schematic

Table 5. Outlet Pressure Ranges

TYPE	OUTLET PRESSURE RANGE ⁽¹⁾		SPRING NUMBER	PART NUMBER	SPRING COLOR	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
	psig	bar				In.	mm	In.	mm
CP400, CP403 ⁽²⁾ and CP404	1 to 2	0.07 to 0.14	1	GE30199X012	Yellow Stripe	0.085	2.16	1.47	37.3
	2 to 5	0.14 to 0.34	2	GE27213X012	Orange Stripe	0.096	2.44	1.47	37.3
CP400 and CP404	5 to 10	0.34 to 0.69	3	GE39890X012	Black Stripe	0.114	2.90	1.47	37.3
	10 to 20	0.69 to 1.4	4	GE30200X012	Purple Stripe	0.137	3.48	1.43	36.3

1. Outlet pressure range is controlled by 67CP Series loading pressure regulator spring.

2. Maximum operating outlet pressure for the integral True-Monitor™ installed on the Type CP403 is 7.5 psig / 0.52 bar.

Principle of Operation

Type CP400 Base Regulator Operation

The CP400 Series has spring-to-close construction. The CP400 Series uses a 67CP Series loading pressure regulator to supply loading pressure to the top of the main diaphragm. Since the loading pressure regulator controls the main regulator, adjustment to the downstream pressure is made to the loading pressure regulator. The load pressure supplied by the loading regulator is constant and equal to the desired downstream pressure plus the pressure required to overcome the light closing spring.

Increasing Downstream Demand

As downstream demand increases the outlet pressure registering on the underside of the main diaphragm decreases and the constant loading pressure above

the main diaphragm forces the diaphragm downward. This downward diaphragm motion is transferred through the lever causing the main disk to move away from the orifice seating surface to supply additional flow downstream to the required demand.

Decreasing Downstream Demand

As downstream demand decreases the outlet pressure registering on the underside of the main diaphragm increases forcing the main diaphragm upward. This upward motion is transferred through the lever causing the main disk to move toward the orifice seating surface to reduce flow to meet the required demand.

Zero Downstream Demand (Lockup)

As downstream demand decreases further, the outlet pressure registering under the main diaphragm together with the closing spring act to close the

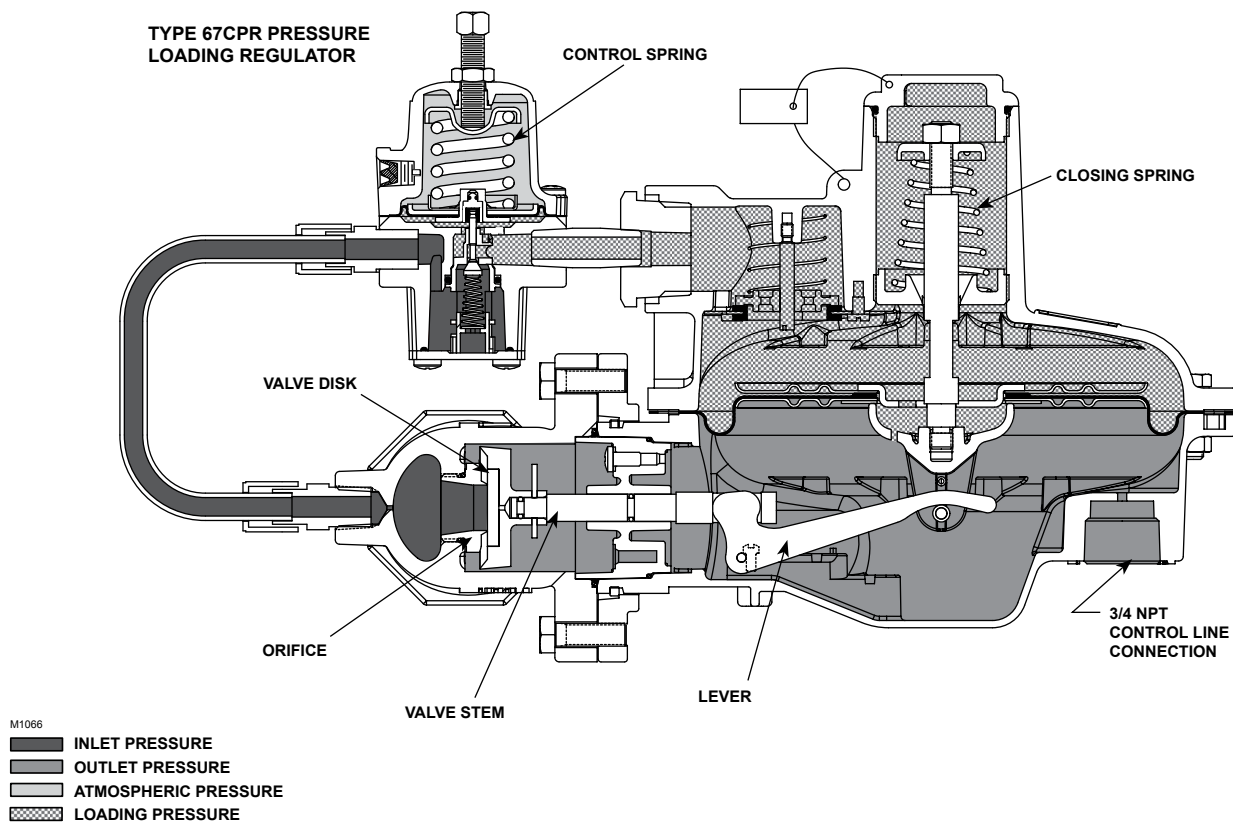


Figure 4. Type CP400ET Pressure Loaded Regulator with External Pressure Registration Operational Schematic

main disk against the orifice seating surface. At this point the loading regulator will continue to supply a small amount of gas downstream that is equal to the capacity of the bleed restriction in the diaphragm assembly. As downstream demand decreases to zero flow outlet pressure rises to meet the lockup pressure of the loading regulator. This causes the loading regulator to lockup to stop all flow downstream.

Downstream Control Line Connection

A CP400 Series regulator with an ET or EN in the type number has a blocked throat, an O-ring stem seal and a 3/4 NPT control line tapping in the lower diaphragm casing, Figure 4. A regulator with a downstream control line is used for monitoring installations or other applications where there are equipment installed between the regulator and the pressure control point. The O-ring stem seal helps separate body pressure from diaphragm case pressure on monitor installations where leakage cannot be tolerated.

The Types CP400IT and CP400ET provide a low capacity/token relief. Token relief provides relief from minor overpressure caused by nicks or dents on the

orifice or by thermal expansion of gas in the downstream line. Token relief also provides a token or signal, in the form of odor, that an overpressure situation is occurring.

Type CP403 Integral Monitor Operation

Type CP403 combines the operation of a conventional two-regulator wide-open monitor set into one body, see Figure 5. The Integral True-Monitor™ is installed on the inlet side of the body and serves to throttle flow and maintain an acceptable downstream pressure in the case where the Primary regulator fails to regulate downstream pressure. During normal operation, the Integral Monitor is in a wide-open state as its setpoint is set higher than the primary regulator. See Tables 6 and 7 for guidance regarding the setpoints of the regulator and associated integral monitor sets. If the downstream pressure should rise to the setpoint of the internal monitor due to loss of pressure control by the primary regulator, the integral monitor will assume control and regulate the flow to the downstream system. See the Type TM600 Instruction Manual for additional details of operation. If a Token relief is present, the token relief will relieve a small amount of gas to the atmosphere as an indication that the Integral Monitor is controlling the downstream pressure.

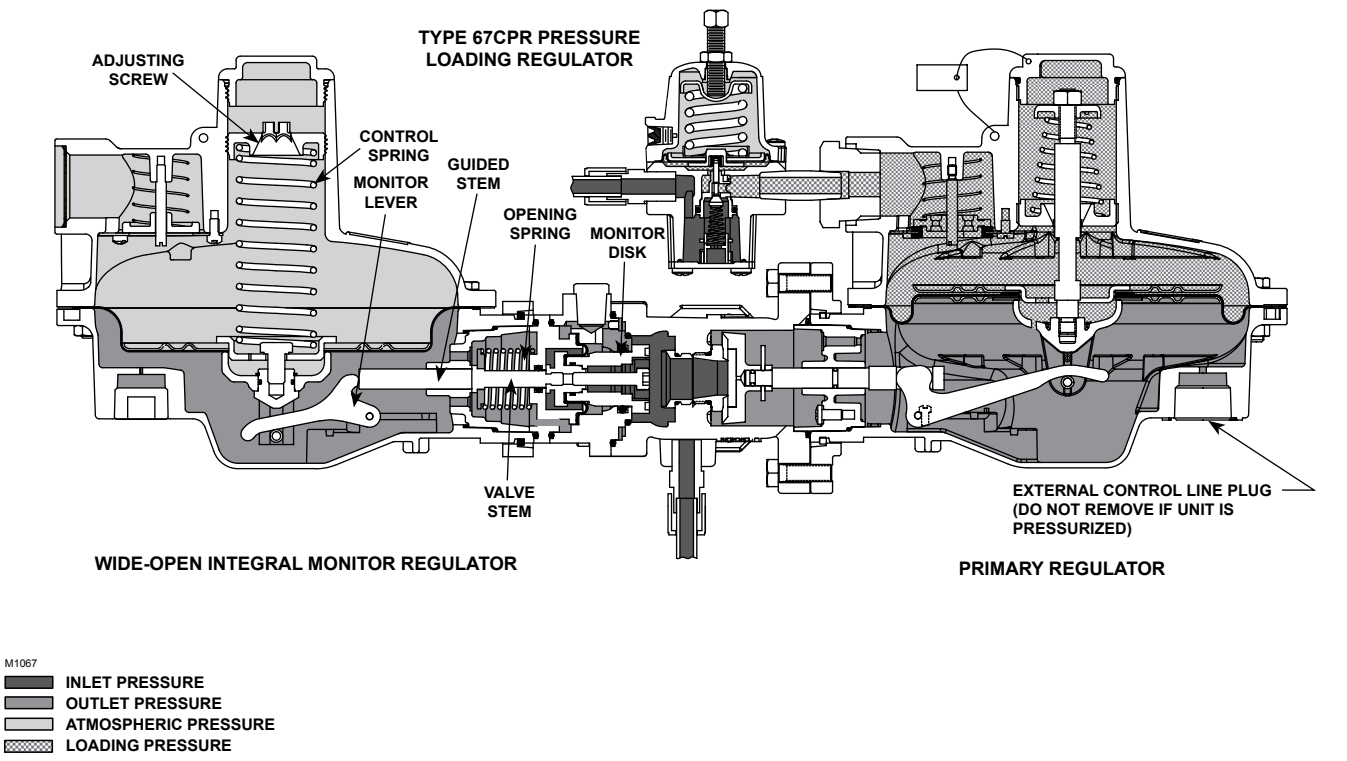


Figure 5. Type CP403IT Pressure Loaded Regulator with True-Monitor™ and Internal Pressure Registration Operational Schematic

Table 6. CP403 Series Spring Ranges (Without Token Relief)

TYPE	PRIMARY REGULATOR					INTEGRAL MONITOR				
	Typical Setpoint		Spring Range		Spring Color	Minimum Setpoint		Spring Range		Spring Color
	psig	bar	psig	bar		psig	bar	psig	bar	
CP403IN and CP403EN	1	0.07	1 to 2	0.07 to 0.14	Yellow Stripe	2	0.14	1.4 to 2.9	0.10 to 0.20	Black
	2	0.14				3	0.21	2.6 to 3.7	0.18 to 0.26	Purple
	3	0.21	2 to 5	0.14 to 0.34	Orange Stripe	5	0.34	3.6 to 6	0.25 to 0.40	Dark Blue
	4	0.28				6	0.41	5.1 to 7.5	0.35 to 0.52	Red
	5	0.34				7	0.48			

Table 7. CP403 Series Spring Ranges (With Token Relief)

TYPE	PRIMARY REGULATOR					INTEGRAL MONITOR				
	Typical Setpoint		Spring Range		Spring Color	Minimum Setpoint		Spring Range		Spring Color
	psig	bar	psig	bar		psig	bar	psig	bar	
CP403IT and CP403ET	1	0.07	1 to 2	0.07 to 0.14	Yellow Stripe	5	0.34	3.6 to 6	0.25 to 0.40	Dark Blue
	2	0.14				5.5	0.38	5.1 to 7.5	0.35 to 0.52	Red

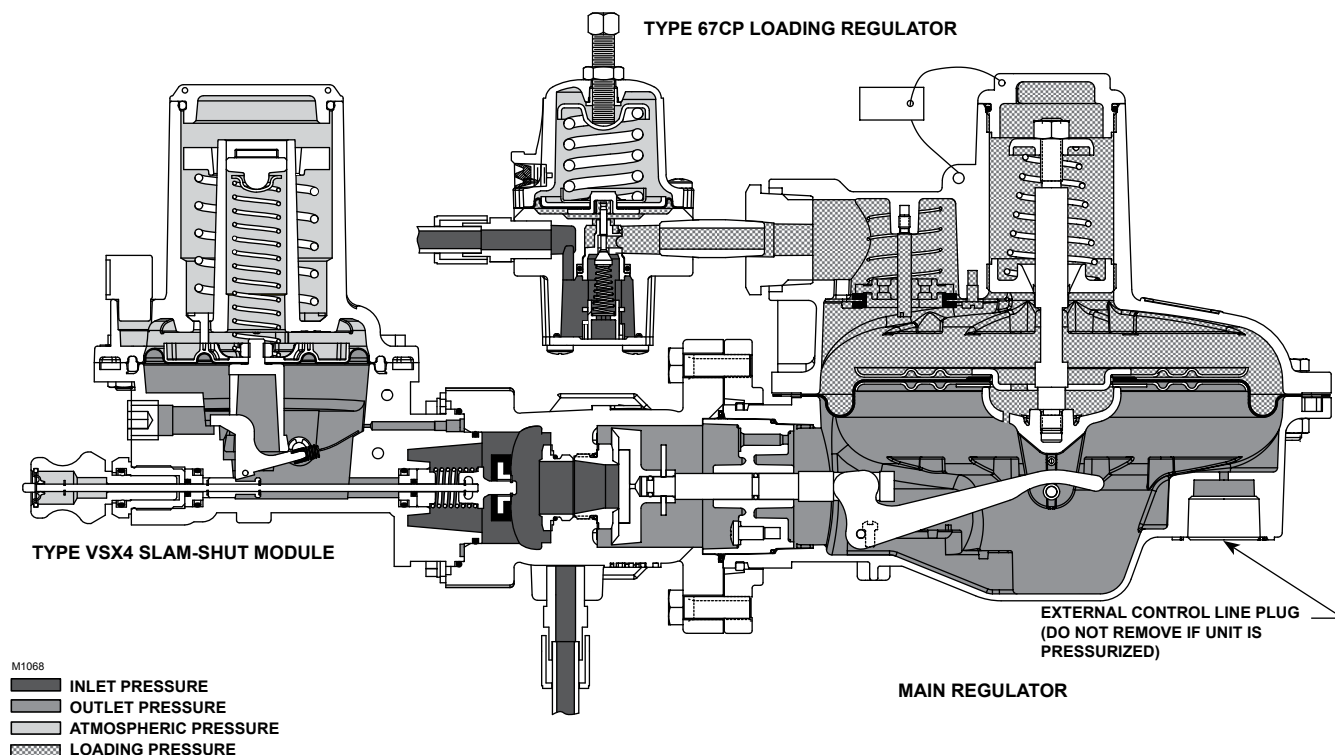


Figure 6. Type CP404IN Pressure Loaded Regulator with Slam-Shut Module and Internal Pressure Registration Operational Schematic

Type CP404 Slam-Shut Operation

The Type VSX4 slam-shut module on the Type CP404 regulator is a fast acting shutoff device that provides overpressure (OPSO) or over and underpressure (OPSO/UPSO) protection by completely shutting off the flow of gas to the downstream system. See Tables 8 and 9 for guidance regarding the typical setpoints of the regulator and associated OPSO and UPSO sets. The Type VSX4's actions are independent of the Type CP404 regulator and of variations to the inlet pressure. The Type VSX4 provides the option of internal or external downstream pressure registration. External registration requires a downstream sensing line.

The Type VSX4 shutoff disk is normally in the open (reset) position, see Figure 6. If the downstream pressure below the slam-shut diaphragm increases (or decreases) until it reaches the slam-shut setpoint, this diaphragm moves upward (or downward) to release the trip mechanism which allows the spring force on the stem to push the disk against the seat, shutting off all gas flow. Refer to the Type VSX4 Instruction Manual to reset the slam-shut device.

In order for the Underpressure Shutoff (UPSO) of any slam-shut to be triggered, the downstream pipe

pressure must drop below the UPSO setpoint. In the case of a downstream line break, numerous factors can prevent the downstream pipe pressure from decreasing below the slam-shut UPSO setpoint. These factors include the distance of pipe to the break, the diameter of the pipe, size of the break and the number of restrictions, such as valves, elbows and bends, downstream of the regulator and/or slam-shut device. Due to these factors additional protections should be installed to stop flow in the event of a line break.

Installation

The CP400 Series regulators may be installed in any position. However, the spring case vent of the 67CP Series loading regulator, Type CP403 Monitor Regulator and Type CP404 Slam-Shut device should be pointed downward. Dimensions are shown in Figure 8.

If gas escaping through the CP400 Series, Type 67CPR token relief valve could constitute a hazard, the pilot spring case vent must be piped to a location where escaping gas will not be hazardous. If the vented gas will be piped to another location, use obstruction-free tubing or piping at least equal in

Table 8. CP404 Series Regulator and Slam-Shut Spring Ranges Overpressure Shutoff (OPSO) Only

TYPE	REGULATOR				SLAM-SHUT				
	Typical Setpoint		Spring Range ⁽¹⁾		Overpressure Shutoff (OPSO)				
					Typical Setpoint		Spring Range		Spring Part Number
	psig	bar	psig	bar	psig	bar	psig	bar	
CP404IN, CP404IT, CP404EN and CP404ET	1	0.07	1 to 2	0.07 to 0.14	5	0.34	2 to 7.3	0.14 to 0.50	GF02172X012
	2	0.14			5.5	0.38			
	3	0.21	2 to 5	0.14 to 0.34	8.5	0.59	3.2 to 11	0.22 to 0.76	GF02173X012
	4	0.28			9.5	0.66			
	5	0.34			10.5	0.72			
	6	0.41	5 to 10	0.34 to 0.69	11.5	0.79	5.8 to 21	0.40 to 1.4	GF04353X012
	7	0.48			14	0.97			
	10	0.69			17	1.2			
	12	0.83			18	1.2			
	15	1.0	10 to 20	0.69 to 1.4	20	1.4			
CP404IN and CP404EN	20	1.4			25	1.7	13.1 to 43.5	0.90 to 3.0	GF02173X012

1. Token Relief is not available with the 10 to 20 psig / 0.69 to 1.4 bar spring range.

Table 9. CP404 Series Regulator and Slam-Shut Spring Ranges Overpressure and Underpressure Shutoff (OPSO and UPSO)

TYPE	REGULATOR				SLAM-SHUT									
	Typical Setpoint		Spring Range ⁽¹⁾		Overpressure Shutoff (OPSO)					Underpressure Shutoff (UPSO)				
					Typical Setpoint		Spring Range		Spring Part Number	Typical Setpoint		Spring Range		Spring Part Number
	psig	bar	psig	bar	psig	bar	psig	bar		psig	bar	psig	bar	
CP404IN, CP404IT, CP404EN and CP404ET	1	0.07	1 to 2	0.07 to 0.14	5	0.34	2.2 to 5.5	0.15 to 0.38	GF02170X012	0.5	0.03	0.36 to 2.3	0.03 to 0.16	T14170T0012
	2	0.14			5.5	0.38				1	0.07			
	3	0.21	2 to 5	0.14 to 0.34	8.5	0.59	5.8 to 16	0.40 to 1.1	GF02172X012	2	0.14	1.5 to 7.3	0.10 to 0.50	FA142869X12
	4	0.28			9.5	0.66				3	0.21			
	5	0.34			10.5	0.72				4	0.28			
	6	0.41	5 to 10	0.34 to 0.69	11.5	0.79				4.5	0.31			
	7	0.48			14	0.97				5.5	0.38			
	10	0.69			17	1.2				8	0.55			
	12	0.83	10 to 20	0.69 to 1.4	18	1.2	11.6 to 3.2	0.80 to 1.6	GF02173X012	9	0.62	1.5 to 10.9	0.10 to 0.75	T14171T0012
	15	1.0			20	1.4				10	0.69			
CP404IN and CP404EN	20	1.4			25	1.7	16 to 29	1.1 to 2.0	GF02171X012	14	0.96	7.3 to 29	0.50 to 2.0	FA142869X12

1. Token Relief is not available with the 10 to 20 psig / 0.69 to 1.4 bar spring range.

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Table 10. Type CP403 Overpressure Protection Benefits vs. Additional Seat Protection

	CP403 SERIES TRUE-MONITOR™ PROTECTION	ADDITIONAL SEAT PROTECTION
Damage/nick on seat	X	X
Damage to disk	X	X
Damage or disconnected lever	X	----
Damage to diaphragm	X	----
Blocked or broken registration to Primary regulator ⁽¹⁾	X	----
1. For external pressure registered units, in order to gain True-Monitor Protection in the case of damaged or broken sense line, it is required that the Primary and Integral Wide-Open Monitor do not share downstream sense lines.		

Table 11. Token Relief Valve Start-to-Discharge Pressure Above Setpoint

SETPPOINT ⁽¹⁾		SPRING COLOR	SPRING PART NUMBER	START-TO-DISCHARGE PRESSURE RANGE ABOVE SETPOINT	
psig	bar			psig	mbar
1 to 2	0.07 to 0.14	Yellow Stripe	GE30199X012	1 to 3.5	69 to 241
2 to 5	0.14 to 0.34	Orange Stripe	GE27213X012	1.75 to 5.5	121 to 379
5 to 10	0.34 to 0.69	Black Stripe	GE39890X012	2.5 to 6.75	172 to 465
1. Outlet pressure range is controlled by 67CP Series pressure loading regulator spring. Only the 1 to 2, 2 to 5 and 5 to 10 psig / 0.07 to 0.14, 0.14 to 0.34 and 0.34 to 0.69 bar spring ranges are available with Token Relief.					

size to the vent, and the end of the vent pipe must be protected from anything that might clog it. Regulators with External Registration require the use of an external control line.

Vent and Body orientation is shown in Figure 7. Dimensions are shown in Figure 8.

Overpressure Protection

The CP400 Series regulators have outlet pressure ratings that are lower than their inlet pressure ratings. A pressure relieving or pressure limiting device is needed for Types CP400IN, CP400EN, CP400IT and CP400ET if inlet pressure can exceed the outlet pressure rating as these regulators do not have standard internal relief, high outlet pressure shutoff or integral slam-shut module.

Token Relief

Types with a “T” in the type number, e.g., Type CP400IT provide an optional small capacity or token relief located in the Type 67CPR to relieve minor overpressure caused by thermal expansion or minor nicks in the orifice or disk.

Integral True-Monitor Protection

Types CP403IN, CP403EN, CP403IT and CP403ET combine the operation of a conventional two-regulator

wide-open monitor set into one body. The Integral True-Monitor is installed on the inlet side of the body and serves to throttle flow and maintain an acceptable downstream pressure in the case where the primary regulator fails to regulate. Unlike multiple seat designs that rely on the primary regulator for all failure modes, the Type CP403 provides protection from a wide variety of failures that could cause the primary regulator not to regulate downstream pressure. Table 10 shows a comparison between the Integral True-Monitor protection and the protection offered by an additional seat.

Pressure Registration

The Integral True-Monitor has the options for internal pressure registration and external registration, denoted by the “I” and “E” in the type number, respectively. The method of pressure registration is dependent on the registration of the primary regulator, see Table 1. For example, if the primary regulator’s registration is internal, then the wide-open monitor regulator’s registration should either be internal or external. If the primary regulator’s registration is external, then the wide-open monitor regulator’s pressure registration must be external.

Token Relief

An optional token relief may be installed on the primary regulator of the Type CP403, denoted by the “T” in the type number, for example, Type CP403IT. The token

relief will be activated when the pressure rises and activates the monitoring regulator in order to provide an indication that the monitor is controlling flow instead of the primary regulator.

Integral Type VSX4 Slam-Shut Module

The Type VSX4 slam-shut module on the CP404 Series regulator is a fast acting safety shutoff device that provides overpressure (OPSO) or over and underpressure (OPSO/UPSO) protection by completely shutting off the flow of gas to the downstream system. The Type VSX4's actions are independent of the CP404 Series regulator and of variations to the inlet pressure. The Type VSX4 provides the option of internal or external downstream pressure registration, see Figure 6. External registration requires a downstream sensing line.

The shutoff disk is normally in the open (reset) position. If the pressure below the diaphragm increases (or decreases) reaching the Type VSX4 setpoint, the diaphragm will travel upwards (or downwards) to release the trip mechanism which allows the spring force on the stem to push the disk against the seat, shutting off all gas flow. The manual reset has an internal bypass to equalize the reset pressure on either side on the shutoff disk.

Overpressuring any portion of a regulator or associated equipment may cause personal injury, leakage or property damage due to bursting of pressure-containing parts or explosion of accumulated gas. Provide appropriate pressure relieving or pressure limiting devices to ensure that the limits in the Specifications section is not exceeded. Regulator operation within ratings does not prevent the possibility of damage from external sources or from debris in the pipeline.

Refer to the relief sizing coefficients and the Capacity Information section to determine the required relief valve capacity.

Capacity Information

Tables 12 to 27 and 29 to 34 give the CP400 Series natural gas regulating capacities at selected inlet pressures, outlet pressure settings and body outlet sizes. Tables 29 through 34 provide capacities specifically for Pressure Factor Measurement (PFM) applications. Flows are in SCFH (60°F and 14.7 psia) and Nm³/h (0°C and 1.01325 bar) of 0.6 specific gravity natural gas. To determine equivalent capacities for air, propane, butane or nitrogen, multiply

the capacity number in the tables by the following appropriate conversion factor: 0.775 for air, 0.628 for propane, 0.548 for butane or 0.789 for nitrogen. For gases of other specific gravities, multiply the given capacity by 0.775 and divide by the square root of the appropriate specific gravity.

Relief Sizing

For critical flow:

To determine wide-open flow capacities for relief sizing of 0.6 specific gravity natural gas at 60°F at critical pressure drops (absolute outlet pressure equal to approximately one-half or less than one-half of the absolute inlet pressure), use the following formula:

$$Q = P_{1abs}(C_g)(1.29)$$

For subcritical flow:

If pressure drops are lower than critical (absolute outlet pressure greater than approximately one-half the absolute inlet pressure), use the following formula and convert according to the factors in the preceding paragraph if necessary:

$$Q = \sqrt{\frac{520}{GT}} C_g P_1 \sin \left(\frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right) \text{ DEG}$$

where:

C_1 = C_g/C_v (see Table 3)

C_g = Gas sizing coefficient (see Table 3)

G = Gas specific gravity (air = 1.0)

P_1 = Regulator inlet pressure, psia

ΔP = Pressure drop across regulator, psi

Q = Gas flow rate, SCFH

T = Absolute temperature of gas at inlet, °Rankine

Note

Due to boost, the above formulas cannot be used to obtain correct regulating capacities for regulators with internal registration.

The published capacities were obtained using inlet and outlet piping the same size as the regulator body size.

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Table 12. CP400 Series Internal Registration Flow Capacities for 1 psig / 0.07 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
1 psig	-0.16 psi	0.16 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.07 bar	-11 mbar	11 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Size: NPS 1-1/4 / DN 32											
3	0.21	310	8.31	500	13.4	940	25.2	1400	37.5	2300	61.6	2400	64.3
5	0.34	520	13.9	970	26.0	1900	50.9	2200	59.0	3500	93.8	3800	102
10	0.69	850	22.8	1500	40.2	2800	75.0	4100	110	5800	155	6000	161
15	1.0	1000	26.8	1800	48.2	3900	105	5700	153	6000	161	6000	161
20	1.3	1200	32.2	2000	53.6	4700	126	6000	161	6000	161	6000	161
30	2.0	1500	40.2	2800	75.0	6000	161	6000	161	5100	137	5500	147
40	2.7	1900	50.9	3300	88.4	6000	161	5200	139	5100	137	5500	147
50	3.4	2200	59.0	3900	105	6000	161	3200	85.8	5100	137		
60	4.1	2400	64.3	4500	121	3200	85.8	3200	85.8				
80	5.5	3300	88.4	5500	147	3200	85.8						
100	6.8	4000	107	7300	196								
125	8.6	4800	129	8400	225								
psig	bar	Body Size: NPS 1-1/2 / DN 40											
3	0.21	390	10.5	590	15.8	1300	34.8	1600	42.9	1600	42.9	2100	56.3
5	0.34	520	13.9	930	24.9	1900	50.9	2900	77.7	3300	88.4	3300	88.4
10	0.69	840	22.5	1300	34.8	2900	77.7	4900	131	5200	139	5200	139
15	1.0	1000	26.8	1600	42.9	3600	96.5	4600	123	6400	172	6400	172
20	1.3	1200	32.2	1900	50.9	4600	123	4600	123	7600	204	8200	220
30	2.0	1600	42.9	2700	72.4	4600	123	4600	123	3700	99.2	10,100	271
40	2.7	1800	48.2	3400	91.1	4600	123	3100	83.1	3500	93.8	12,000	322
50	3.4	2200	59.0	4000	107	4000	107	3100	83.1	3500	93.8		
60	4.1	2500	67.0	4300	115	3800	102	3000	80.4				
80	5.5	3300	88.4	5400	145	3800	102						
100	6.8	4000	107	5600	150								
125	8.6	4900	131	7900	212								
psig	bar	Body Size: NPS 2 / DN 50											
3	0.21	410	11.0	570	15.3	1100	29.5	1700	45.6	1700	45.6	2400	64.3
5	0.34	550	14.7	890	23.9	1900	50.9	2900	77.7	3100	83.1	4200	113
10	0.69	820	22.0	1400	37.5	3100	83.1	4700	126	6300	169	4200	113
15	1.0	1000	26.8	1800	48.2	4000	107	5600	150	10,700	287	5600	150
20	1.3	1200	32.2	2100	56.3	4800	129	5600	150	10,700	287	9700	260
30	2.0	1500	40.2	2800	75.0	5600	150	5600	150	10,700	287	7300	196
40	2.7	1900	50.9	3400	91.1	5600	150	5600	150	8500	228	5400	145
50	3.4	2300	61.6	4000	107	5600	150	5600	150	5700	153		
60	4.1	2600	69.7	4600	123	5600	150	5600	150				
80	5.5	3300	88.4	5600	150	5600	150						
100	6.8	4100	110	6500	174								
125	8.6	5000	134	7000	188								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
Gray areas indicate limited capacities due to boost effects.

Table 13. CP400 Series Internal Registration Flow Capacities for 2 psig / 0.14 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
2 psig	-0.17 psi	0.17 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.14 bar	-12 mbar	12 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig		Body Size: NPS 1-1/4 / DN 32											
5	0.34	470	12.6	970	26.0	1400	37.5	1900	50.9	2700	72.4	3800	102
10	0.69	800	21.4	1300	34.8	2800	75.0	4100	110	5200	139	7100	190
15	1.0	1000	26.8	1800	48.2	3800	102	5000	134	5700	153	7200	193
20	1.3	1200	32.2	2100	56.3	4700	126	5000	134	5700	153	7200	193
30	2.0	1500	40.2	2700	72.4	6000	161	3200	85.8	5700	153	7200	193
40	2.7	1900	50.9	3300	88.4	6000	161	3200	85.8	5700	153	7200	193
50	3.4	2200	59.0	3900	105	6000	161	3200	85.8	5700	153		
60	4.1	2500	67.0	4200	113	4500	121	3200	85.8				
80	5.5	3300	88.4	4200	113	2900	77.7						
100	6.8	3300	88.4	4200	113								
125	8.6	3300	88.4	4200	113								
psig		Body Size: NPS 1-1/2 / DN 40											
5	0.34	420	11.3	820	22.0	1900	50.9	350	9.38	2700	72.4	2800	75.0
10	0.69	810	21.7	1400	37.5	3200	85.8	3900	105	5300	142	6400	172
15	1.0	1000	26.8	1500	40.2	4000	107	5600	150	7000	188	9000	241
20	1.3	1100	29.5	2100	56.3	4700	126	7100	190	8400	225	9700	260
30	2.0	1500	40.2	2600	69.7	6000	161	7400	198	8400	225	10,200	273
40	2.7	1900	50.9	3200	85.8	7400	198	3700	99.2	8400	225	12,100	324
50	3.4	2100	56.3	3900	105	7400	198	3200	85.8	4200	113		
60	4.1	2400	64.3	4700	126	7400	198	3200	85.8				
80	5.5	3300	88.4	6000	161	7400	198						
100	6.8	4100	110	6500	174								
125	8.6	4900	131	6500	174								
psig		Body Size: NPS 2 / DN 50											
5	0.34	530	14.2	850	22.8	1400	37.5	2100	56.3	3000	80.4	3400	91.1
10	0.69	820	22.0	1500	40.2	3100	83.1	4400	118	5700	153	9500	255
15	1.0	1000	26.8	1800	48.2	4000	107	6100	163	10,100	271	10,100	271
20	1.3	1200	32.2	2100	56.3	4600	123	7100	190	10,100	271	10,100	271
30	2.0	1500	40.2	2700	72.4	6000	161	7100	190	10,100	271	8600	230
40	2.7	1900	50.9	3300	88.4	6000	161	7100	190	6200	166	6700	180
50	3.4	2200	59.0	4000	107	6000	161	7100	190	4900	131		
60	4.1	2600	69.7	4700	126	6000	161	7100	190				
80	5.5	3400	91.1	6000	161	6000	161						
100	6.8	4100	110	6000	161								
125	8.6	5000	134	6000	161								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
Gray areas indicate limited capacities due to boost effects.

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Table 14. CP400 Series Internal Registration Flow Capacities for 5 psig / 0.34 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
5 psig	-0.2 psi	0.2 psi	2 to 5 psig	GE27213X012 / Orange Stripe
0.34 bar	-14 mbar	14 mbar	0.14 to 0.34 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Size: NPS 1-1/4 / DN 32											
10	0.69	650	17.4	1200	32.2	2500	67.0	3100	83.1	3400	91.1	6000	161
15	1.0	1000	26.8	1700	45.6	3200	85.8	4300	115	6000	161	6000	161
20	1.3	1200	32.2	2100	56.3	4100	110	6000	161	6000	161	6000	161
30	2.0	1500	40.2	2600	69.7	6000	161	6000	161	6000	161	6000	161
40	2.7	1900	50.9	3000	80.4	6000	161	6000	161	5700	153	5200	139
50	3.4	2200	59.0	4100	110	6000	161	4300	115	3500	93.8		
60	4.1	2600	69.7	4700	126	6000	161	4300	115				
80	5.5	3300	88.4	5000	134	5500	147						
100	6.8	3900	105	5000	134								
125	8.6	5000	134	5000	134								
psig	bar	Body Size: NPS 1-1/2 / DN 40											
10	0.69	740	19.8	1000	26.8	2500	67.0	3800	102	5900	158	6500	174
15	1.0	980	26.3	1500	40.2	3500	93.8	5900	158	8700	233	8700	233
20	1.3	1200	32.2	2000	53.6	4300	115	6600	177	8700	233	8700	233
30	2.0	1500	40.2	2700	72.4	5500	147	6600	177	5700	153	5200	139
40	2.7	1800	48.2	3200	85.8	6600	177	6600	177	5700	153	5200	139
50	3.4	2400	64.3	3700	99.2	8800	236	5000	134	5300	142		
60	4.1	2600	69.7	4700	126	10,400	279	4700	126				
80	5.5	3200	85.8	5700	153	12,000	322						
100	6.8	4000	107	6300	169								
125	8.6	4700	126	6300	169								
psig	bar	Body Size: NPS 2 / DN 50											
10	0.69	680	18.2	1100	29.5	2600	69.7	3300	88.4	3800	102	5400	145
15	1.0	1000	26.8	1700	45.6	3800	102	5000	134	5900	158	11,000	295
20	1.3	1200	32.2	2100	56.3	4600	123	6400	172	12,400	332	12,900	346
30	2.0	1500	40.2	2700	72.4	6400	172	8700	233	12,900	346	12,900	346
40	2.7	1900	50.9	3400	91.1	7700	206	8700	233	6100	163	5400	145
50	3.4	2200	59.0	3900	105	7800	209	8700	233	5900	158		
60	4.1	2600	69.7	4500	121	7800	209	8800	236				
80	5.5	3300	88.4	5700	153	6700	180						
100	6.8	4000	107	6900	185								
125	8.6	4800	129	8900	239								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
 Gray areas indicate limited capacities due to boost effects.

Table 15. CP400 Series Internal Registration Flow Capacities for 10 psig / 0.69 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
10 psig	-0.25 psi	0.25 psi	5 to 10 psig	GE39890X012 / Black Stripe
0.69 bar	-17 mbar	17 mbar	0.34 to 0.69 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Size: NPS 1-1/4 / DN 32											
15	1.0	820	22.0	1300	34.8	2700	72.4	3900	105	5200	139	5200	139
20	1.3	1100	29.5	1900	50.9	3200	85.8	5500	147	5800	155	7400	198
30	2.0	1300	34.8	2700	72.4	5700	153	7100	190	7100	190	7400	198
40	2.7	1700	45.6	3100	83.1	7100	190	7100	190	7100	190	7400	198
50	3.4	2300	61.6	3900	105	7100	190	7100	190	7100	190		
60	4.1	2500	67.0	4500	121	7500	201	7500	201				
80	5.5	3200	85.8	5200	139	7500	201						
100	6.8	4100	110	5200	139								
125	8.6	4600	123	5200	139								
psig	bar	Body Size: NPS 1-1/2 / DN 40											
15	1.0	770	20.6	1300	34.8	2500	67.0	3900	105	5900	158	7800	209
20	1.3	1100	29.5	1500	40.2	4100	110	4200	113	7700	206	9700	260
30	2.0	1500	40.2	2700	72.4	6100	163	6700	180	9700	260	9700	260
40	2.7	1900	50.9	3400	91.1	6700	180	6700	180	6700	180	9700	260
50	3.4	2200	59.0	4000	107	6800	182	6800	182	5200	139		
60	4.1	2600	69.7	4700	126	7200	193	5100	137				
80	5.5	3300	88.4	5400	145	5400	145						
100	6.8	4000	107	5600	150								
125	8.6	5000	134	5600	150								
psig	bar	Body Size: NPS 2 / DN 50											
15	1.0	590	15.8	1200	32.2	3000	80.4	3600	96.5	4800	129	4800	129
20	1.3	1100	29.5	1600	42.9	3100	83.1	5100	137	7800	209	9500	255
30	2.0	1500	40.2	2800	75.0	5900	158	8800	236	7800	209	11,900	319
40	2.7	1800	48.2	2800	75.0	7600	204	9900	265	7800	209	11,900	319
50	3.4	2200	59.0	4000	107	9200	247	9900	265	7800	209		
60	4.1	2600	69.7	4700	126	9200	247	9900	265				
80	5.5	3300	88.4	5600	150	9200	247						
100	6.8	4100	110	7100	190								
125	8.6	5000	134	8600	230								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
 Gray areas indicate limited capacities due to boost effects.

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Table 16. CP400 Series Internal Registration Flow Capacities for 15 psig / 1.0 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
15 psig	-0.30 psi	0.30 psi	10 to 20 psig	GE30200X012 / Purple Stripe
1.0 bar	-20 mbar	20 mbar	0.69 to 1.4 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Size: NPS 1-1/4 / DN 32											
20	1.3	460	12.3	1500	40.2	2800	75.0	4200	113	4700	126	5400	145
30	2.0	1500	40.2	2600	69.7	5100	137	7200	193	10,400	279	15,400	413
40	2.7	1900	50.9	3300	88.4	7300	196	9400	252	11,100	297	15,400	413
50	3.4	2200	59.0	4000	107	7500	201	11,000	295	11,100	297		
60	4.1	2600	69.7	4600	123	9800	263	11,000	295				
80	5.5	3300	88.4	5900	158	11,000	295						
100	6.8	4000	107	7200	193								
125	8.6	4900	131	7500	201								
psig	bar	Body Size: NPS 1-1/2 / DN 40											
20	1.3	700	18.8	1400	37.5	2800	75.0	4200	113	6400	172	7100	190
30	2.0	1500	40.2	2500	67.0	5800	155	8600	230	11,800	316	12,200	327
40	2.7	1900	50.9	3400	91.1	7300	196	10,000	268	11,800	316	12,200	327
50	3.4	2300	61.6	4000	107	7500	201	10,300	276	7600	204		
60	4.1	2600	69.7	4600	123	7500	201	6700	180				
80	5.5	3300	88.4	5900	158	7500	201						
100	6.8	4100	110	6500	174								
125	8.6	5000	134	6500	174								
psig	bar	Body Size: NPS 2 / DN 50											
20	1.3	670	18.0	1500	40.2	2700	72.4	3500	93.8	6600	177	7700	206
30	2.0	1400	37.5	2500	67.0	5600	150	8300	222	13,900	373	17,100	458
40	2.7	1800	48.2	3400	91.1	7600	204	12,300	330	15,600	418	17,200	461
50	3.4	2200	59.0	4000	107	9100	244	14,700	394	15,600	418		
60	4.1	2600	69.7	4600	123	10,500	281	15,600	418				
80	5.5	3300	88.4	5900	158	13,600	364						
100	6.8	3900	105	7100	190								
125	8.6	4800	129	8900	239								
<div> <div></div> Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded. <div></div> Gray areas indicate limited capacities due to boost effects. </div>													

Table 17. CP400 Series Internal Registration Flow Capacities for 20 psig / 1.4 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
20 psig	-0.35 psi	0.35 psi	10 to 20 psig	GE30200X012 / Purple Stripe
1.4 bar	-24 mbar	24 mbar	0.69 to 1.4 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Size: NPS 1-1/4 / DN 32											
30	2.0	1300	34.8	2300	61.6	4100	110	7100	190	8800	236	8800	236
40	2.7	1800	48.2	3400	91.1	6800	182	10,900	292	11,200	300	15,800	423
50	3.4	2200	59.0	4000	107	7300	196	13,000	348	15,800	423		
60	4.1	2600	69.7	4700	126	10,300	276	15,800	423				
80	5.5	3300	88.4	5900	158	11,100	297						
100	6.8	4100	110	7200	193								
125	8.6	4500	121	8800	236								
psig	bar	Body Size: NPS 1-1/2 / DN 40											
30	2.0	1300	34.8	2000	53.6	4800	129	6100	163	11,600	311	13,700	367
40	2.7	1700	45.6	3300	88.4	7000	188	10,200	273	15,600	418	15,600	418
50	3.4	2300	61.6	3900	105	8400	225	11,000	295	15,800	423		
60	4.1	2500	67.0	4700	126	9800	263	14,600	391				
80	5.5	3300	88.4	6100	163	12,200	327						
100	6.8	4100	110	7200	193								
125	8.6	5000	134	8100	217								
psig	bar	Body Size: NPS 2 / DN 50											
30	2.0	1300	34.8	2500	67.0	5100	137	6700	180	8400	225	13,300	356
40	2.7	1900	50.9	3300	88.4	7500	201	10,600	284	11,400	306	15,600	418
50	3.4	2200	59.0	4000	107	9200	247	13,900	373	14,300	383		
60	4.1	2600	69.7	4600	123	10,300	276	15,800	423				
80	5.5	3400	91.1	5900	158	13,700	367						
100	6.8	4100	110	7300	196								
125	8.6	4900	131	8800	236								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

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Table 18. Types CP403 and CP404 Internal Registration Flow Capacities for 2 psig / 0.14 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
2 psig	-0.17 psi	0.17 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.14 bar	-12 mbar	12 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
3	0.21	240	6.43	450	12.1	840	22.5	880	23.6	1400	37.5	1300	34.8
5	0.34	450	12.1	740	19.8	1400	37.5	2500	67.0	2500	67.0	3200	85.8
10	0.69	810	21.7	1300	34.8	3000	80.4	4400	118	5600	150	6500	174
15	1.0	980	26.3	1800	48.2	4000	107	6000	161	8200	220	9800	263
20	1.4	1200	32.2	2100	56.3	4700	126	7500	201	8200	220	9800	263
30	2.1	1500	40.2	2700	72.4	6300	169	7500	201	5100	137	5600	150
40	2.8	1900	50.9	3400	91.1	7900	212	4900	131	4400	118	4700	126
50	3.4	2200	59.0	4200	113	7900	212	4400	118	4000	107		
60	4.1	2600	69.7	4700	126	4700	126	4400	118				
80	5.5	3300	88.4	4700	126	4700	126						
100	6.9	4000	107	5100	137								
125	8.6	4900	131	5100	137								

☐ Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
☐ Gray areas indicate limited capacities due to boost effects.

Table 19. Types CP403 and CP404 Internal Registration Flow Capacities for 5 psig / 0.34 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
5 psig	-0.2 psi	0.2 psi	2 to 5 psig	GE27213X012 / Orange Stripe
0.34 bar	-14 mbar	14 mbar	0.14 to 0.34 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
10	0.69	630	16.9	1000	26.8	1600	42.9	2700	72.4	3500	93.8	3700	99.2
15	1.0	910	24.4	1400	37.5	3000	80.4	4400	118	5400	145	7400	198
20	1.4	1100	29.5	2000	53.6	4000	107	6000	161	6800	182	7400	198
30	2.1	1500	40.2	2700	72.4	6000	161	6000	161	6800	182	7400	198
40	2.8	1900	50.9	3300	88.4	6000	161	5200	139	6800	182	6300	169
50	3.4	2200	59.0	4000	107	6000	161	4400	118	7200	193		
60	4.1	2600	69.7	4700	126	5100	137	4400	118				
80	5.5	3300	88.4	6000	161	3700	99.2						
100	6.9	4000	107	6700	180								
125	8.6	4500	121	8400	225								

☐ Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
☐ Gray areas indicate limited capacities due to boost effects.

Table 20. CP400 Series External Registration Flow Capacities for 1 psig / 0.07 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
1 psig	-0.16 psi	0.16 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.07 mbar	-11 mbar	11 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
3	0.21	330	8.84	330	8.84	890	23.9	1700	45.6	1700	45.6	1700	45.6
5	0.34	400	10.7	690	18.5	1800	48.2	2500	67.0	2500	67.0	2900	77.7
10	0.69	820	22.0	1400	37.5	2500	67.0	3600	96.5	3600	96.5	5700	153
15	1.0	1000	26.8	1800	48.2	3300	88.4	5100	137	5100	137	8700	233
20	1.3	1200	32.2	2200	59.0	4100	110	6300	169	6400	172	8700	233
30	2.0	1500	40.2	2700	72.4	5800	155	8500	228	11,200	300	8700	233
40	2.7	1900	50.9	3200	85.8	6900	185	11,100	297	14,300	383	8700	233
50	3.4	2300	61.6	3900	105	6900	185	13,800	370	15,200	407		
60	4.1	2700	72.4	4600	123	6900	185	15,200	407				
80	5.5	3300	88.4	5800	155	6900	185						
100	6.8	4100	110	7000	188								
125	8.6	5000	134	7000	188								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

Table 21. CP400 Series External Registration Flow Capacities for 2 psig / 0.14 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
2 psig	-0.17 psi	0.17 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.14 bar	-12 mbar	12 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
5	0.34	500	13.4	800	21.4	1300	34.8	1600	42.9	1600	42.9	2200	59.0
10	0.69	800	21.4	1000	26.8	2400	64.3	3700	99.2	3700	99.2	5300	142
15	1.0	1000	26.8	1600	42.9	3100	83.1	5600	150	6300	169	7300	196
20	1.3	1200	32.2	2100	56.3	4100	110	6100	163	8500	228	13,800	370
30	2.0	1600	42.9	2400	64.3	5600	150	6300	169	13,000	348	15,200	407
40	2.7	1900	50.9	3200	85.8	6500	174	9300	249	13,000	348	15,200	407
50	3.4	2300	61.6	3500	93.8	6500	174	12,300	330	13,000	348		
60	4.1	2600	69.7	4500	121	6500	174	13,000	348				
80	5.5	3400	91.1	5800	155	6500	174						
100	6.8	3800	102	7100	190								
125	8.6	4900	131	8700	233								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

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Table 22. CP400 Series External Registration Flow Capacities for 5 psig / 0.34 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
5 psig	-0.2 psi	0.2 psi	2 to 5 psig	GE27213X012 / Orange Stripe
0.34 bar	-14 mbar	14 mbar	0.14 to 0.34 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
10	0.69	520	13.9	980	26.3	1300	34.8	2200	59.0	3300	88.4	3300	88.4
15	1.0	770	20.6	1500	40.2	2900	77.7	4400	118	6600	177	6800	182
20	1.3	1100	29.5	2000	53.6	3800	102	6000	161	11,700	314	12,800	343
30	2.0	1300	34.8	2400	64.3	5300	142	8400	225	12,800	343	13,900	373
40	2.7	1700	45.6	3200	85.8	6500	174	10,800	289	17,200	461	17,200	461
50	3.4	1900	50.9	3800	102	9000	241	13,100	351	17,200	461		
60	4.1	2200	59.0	4400	118	9500	255	14,500	389				
80	5.5	3100	83.1	5900	158	13,300	356						
100	6.8	3900	105	7000	188								
125	8.6	4800	129	8700	233								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

Table 23. CP400 Series External Registration Flow Capacities for 10 psig / 0.69 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
10 psig	-0.25 psi	0.25 psi	5 to 10 psig	GE39890X012 / Black Stripe
0.69 bar	-17 mbar	17 mbar	0.34 to 0.69 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
15	1.0	650	17.4	1300	34.8	2000	53.6	3100	83.1	3800	102	6300	169
20	1.3	990	26.5	1700	45.6	2700	72.4	6200	166	9800	263	10,300	276
30	2.0	1400	37.5	2400	64.3	5800	155	9500	255	14,500	389	15,800	423
40	2.7	1700	45.6	3100	83.1	6400	172	10,000	268	15,800	423	17,200	461
50	3.4	2000	53.6	3900	105	8700	233	12,300	330	16,700	448		
60	4.1	2500	67.0	4500	121	9200	247	13,300	356				
80	5.5	3100	83.1	5800	155	10,300	276						
100	6.8	3500	93.8	7000	188								
125	8.6	4400	118	8500	228								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

Table 24. CP400 Series External Registration Flow Capacities for 15 psig / 1.0 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
15 psig	-0.30 psi	0.30 psi	10 to 20 psig	GE30200X012 / Purple Stripe
1.0 bar	-20 mbar	20 mbar	0.69 to 1.4 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
20	1.3	680	18.2	1300	34.8	2500	67.0	2800	75.0	4000	107	8500	228
30	2.0	1300	34.8	2200	59.0	5300	142	6300	169	8500	228	15,000	402
40	2.7	1500	40.2	3300	88.4	6100	163	11,800	316	14,300	383	17,600	472
50	3.4	2200	59.0	3600	96.5	7600	204	12,800	343	16,700	448		
60	4.1	2400	64.3	4500	121	10,500	281	14,400	386				
80	5.5	3000	80.4	5800	155	11,700	314						
100	6.8	3600	96.5	6700	180								
125	8.6	4300	115	8500	228								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

Table 25. CP400 Series External Registration Flow Capacities for 20 psig / 1.4 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
20 psig	-0.35 psi	0.35 psi	10 to 20 psig	GE30200X012 / Purple Stripe
1.4 bar	-24 mbar	24 mbar	0.69 to 1.4 bar	

CAPACITIES IN SCFH / Nm ³ /h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h	SCFH	Nm ³ /h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
30	2.0	960	25.7	2500	67.0	3400	91.1	6600	177	11,800	316	14,200	381
40	2.7	1400	37.5	2900	77.7	5500	147	9500	255	12,800	343	17,600	472
50	3.4	1900	50.9	3700	99.2	7500	201	13,600	364	14,400	386		
60	4.1	2600	69.7	4000	107	8600	230	13,600	364				
80	5.5	3000	80.4	5800	155	11,700	314						
100	6.8	3900	105	6500	174								
125	8.6	4900	131	8200	220								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

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Table 26. Types CP403 and CP404 External Registration Flow Capacities for 2 psig / 0.14 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
2 psig	-0.17 psi	0.17 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.14 bar	-12 mbar	12 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
3	0.20	280	7.50	380	10.2	740	19.8	1200	32.2	1400	37.5	1400	37.5
5	0.34	450	12.1	770	20.6	1400	37.5	1800	48.2	2200	59.0	2800	75.0
10	0.69	740	19.8	1300	34.8	2400	64.3	3300	88.4	3700	99.2	5400	145
15	1.0	1000	26.8	1600	42.9	3000	80.4	4700	126	6800	182	7900	212
20	1.4	1100	29.5	2100	56.3	4200	113	6100	163	9300	249	11,400	306
30	2.1	1500	40.2	2600	69.7	6000	161	9300	249	13,700	367	16,900	453
40	2.8	1900	50.9	3400	91.1	7400	198	11,800	316	18,700	501	21,000	563
50	3.4	2200	59.0	4000	107	9000	241	15,500	415	23,300	624		
60	4.1	2600	69.7	4700	126	10,700	287	17,300	464				
80	5.5	3300	88.4	6000	161	13,700	367						
100	6.9	4000	107	7400	198								
125	8.6	4900	131	9000	241								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

Table 27. Types CP403 and CP404 External Registration Flow Capacities for 5 psig / 0.34 bar Setpoint

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
5 psig	-0.2 psi	0.2 psi	2 to 5 psig	GE27213X012 / Orange Stripe
0.34 bar	-14 mbar	14 mbar	0.14 to 0.34 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS													
Inlet Pressure		Orifice Size											
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		5/8 In. / 16 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Sizes: NPS 1-1/4, 1-1/2 and 2 / DN 32, 40 and 50											
10	0.69	520	13.9	1000	26.8	1500	40.2	2400	64.3	2800	75.0	3100	83.1
15	1.0	810	21.7	1300	34.8	2700	72.4	3700	99.2	4500	121	5600	150
20	1.4	1000	26.8	1800	48.2	3200	85.8	5200	139	6300	169	8100	217
30	2.1	1400	37.5	2700	72.4	4900	131	7700	206	10,500	281	13,200	354
40	2.8	1800	48.2	3200	85.8	6800	182	10,200	273	15,300	410	18,500	496
50	3.4	2100	56.3	4000	107	9100	244	13,000	348	19,900	533		
60	4.1	2500	67.0	4500	121	10,000	268	16,700	448				
80	5.5	3200	85.8	5800	155	13,000	348						
100	6.9	4000	107	7000	188								
125	8.6	4700	126	8200	220								

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.

Table 28. Type CP400 Inlet Set Pressure for Pressure Factor Measurement (PFM) Service

BODY SIZE, NPS / DN	SETPOINT		ORIFICE SIZE, In. / mm									
			3/16 / 4.8		1/4 / 6.4		3/8 / 9.5		1/2 / 13		3/4 / 19	
	psig	bar	Inlet Set Pressure		Inlet Set Pressure		Inlet Set Pressure		Inlet Set Pressure		Inlet Set Pressure	
1-1/4 / 32	2	0.14	60	4.1	60	4.1	40	2.8	25	1.7	10	0.69
	5	0.34	40	2.8	60	4.1	25	1.7	25	1.7	15	1.0
	7	0.48	80	5.5	40	2.8	50	3.4	25	1.7	25	1.7
	10	0.69	80	5.5	80	5.5	25	1.7	25	1.7	20	1.4
	15	1.0	60	4.1	40	2.8	25	1.7	25	1.7	25	1.7
	20	1.4	60	4.1	40	2.8	40	2.8	30	2.1	25	1.7
1-1/2 / 40	2	0.14	80	5.5	60	4.1	25	1.7	25	1.7	10	0.69
	5	0.34	60	4.1	60	4.1	25	1.7	25	1.7	15	1.0
	7	0.48	60	4.1	60	4.1	25	1.7	25	1.7	25	1.7
	10	0.69	80	5.5	60	4.1	60	4.1	25	1.7	20	1.4
	15	1.0	60	4.1	40	2.8	25	1.7	25	1.7	25	1.7
	20	1.4	60	4.1	40	2.8	40	2.8	30	2.1	30	2.1
2 / 50	2	0.14	60	4.1	60	4.1	30	2.1	25	1.7	20	1.4
	5	0.34	60	4.1	50	3.4	25	1.7	25	1.7	20	1.4
	7	0.48	80	5.5	60	4.1	25	1.7	25	1.7	25	1.7
	10	0.69	60	4.1	40	2.8	25	1.7	25	1.7	20	1.4
	15	1.0	60	4.1	60	4.1	25	1.7	25	1.7	30	2.1
	20	1.4	60	4.1	40	2.8	30	2.1	30	2.1	25	1.7

Table 29. CP400 Series Internal Registration Flow Capacities for 2 psig / 0.14 bar Setpoint with 1% Pressure Factor Accuracy

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
2 psig	-0.17 psi	0.17 psi	1 to 2 psig	GE30199X012 / Yellow Stripe
0.14 bar	-12 mbar	12 mbar	0.07 to 0.14 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS											
Inlet Pressure		Orifice Size									
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		3/4 In. / 19 mm	
psig	bar	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
Body Size: NPS 1-1/4 / DN 32											
10	0.69	750	20.1	1300	34.8	2200	59.0	3600	96.5	6500	174
15	1.0	990	26.5	1800	48.2	3500	93.8	5000	134	7200	193
20	1.4	1100	29.5	2100	56.3	4300	115	5000	134	7200	193
25	1.7	1300	34.8	2400	64.3	5100	137	5000	134	7200	193
30	2.1	1400	37.5	2700	72.4	5800	155	5000	134	3900	105
40	2.8	1900	50.9	3300	88.4	6000	161	4700	126	3100	83.1
50	3.4	2200	59.0	3900	105	4200	113	4700	126		
60	4.1	2500	67.0	4200	113	4200	113	4700	126		
80	5.5	3200	85.8	4200	113	4200	113				
Body Size: NPS 1-1/2 / DN 40											
10	0.69	690	18.5	1200	32.2	2500	67.0	3700	99.2	6400	172
15	1.0	960	25.7	1500	40.2	3500	93.8	5600	150	6400	172
20	1.4	1100	29.5	2100	56.3	4400	118	5600	150	6400	172
25	1.7	1300	34.8	2400	64.3	5300	142	5600	150	4000	107
30	2.1	1400	37.5	2600	69.7	5600	150	5600	150	3400	91.1
40	2.8	1800	48.2	3200	85.8	5600	150	3400	91.1	3200	85.8
50	3.4	2100	56.3	3900	105	5600	150	3200	85.8		
60	4.1	2400	64.3	4700	126	5600	150	3200	85.8		
80	5.5	3200	85.8	5900	158	6300	169				
100	6.9	3800	102								
Body Size: NPS 2 / DN 50											
10	0.69	620	16.6	1200	32.2	2600	69.7	3000	80.4	4800	129
15	1.0	890	23.9	1800	48.2	3600	96.5	5700	153	5700	153
20	1.4	1000	26.8	2100	56.3	4500	121	7100	190	7100	190
25	1.7	1300	34.8	2400	64.3	5400	145	7100	190	6100	163
30	2.1	1500	40.2	2700	72.4	6000	161	7100	190	5700	153
40	2.8	1900	50.9	3300	88.4	6000	161	7100	190	4900	131
50	3.4	2200	59.0	4000	107	6000	161	7100	190		
60	4.1	2600	69.7	4600	123	6000	161	7100	190		
80	5.5	3300	88.4	5900	158	6000	161				

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
 Gray areas indicate limited capacities due to boost effects.

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Table 30. CP400 Series Internal Registration Flow Capacities for 5 psig / 0.34 bar Setpoint with 1% Pressure Factor Accuracy per Measurement Canada

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
5 psig	-0.2 psi	0.2 psi	2 to 5 psig	GE27213X012 / Orange Stripe
0.34 bar	-14 mbar	14 mbar	0.14 to 0.34 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS																	
Inlet Pressure		Orifice Size															
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		3/4 In. / 19 mm							
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h						
psig	bar	Body Size: NPS 1-1/4 / DN 32															
10	0.69	270	7.24	490	13.1	590	15.8	1500	40.2	2800	75.0						
15	1.0	760	20.4	1100	29.5	2900	77.7	4300	115	6000	161						
20	1.4	1000	26.8	1800	48.2	3900	105	5300	142	6000	161						
25	1.7	1100	29.5	2300	61.6	4800	129	5300	142	6000	161						
30	2.1	1300	34.8	2600	69.7	5000	134	5300	142	4600	123						
40	2.8	1500	40.2	3000	80.4	5000	134	5300	142	3700	99.2						
50	3.4	1900	50.9	3800	102	5000	134	5300	142								
60	4.1	2400	64.3	4500	121	5000	134	5300	142								
80	5.5	3000	80.4	5000	134	5000	134										
100	6.9	3800	102	5000	134												
psig	bar	Body Size: NPS 1-1/2 / DN 40															
10	0.69	460	12.3	1000	26.8	1300	34.8	2600	69.7	2900	77.7						
15	1.0	730	19.6	1500	40.2	3000	80.4	5300	142	2900	77.7						
20	1.4	1100	29.5	2000	53.6	4200	113	5300	142	2900	77.7						
25	1.7	1100	29.5	2300	61.6	5000	134	5300	142	2900	77.7						
30	2.1	1400	37.5	2600	69.7	5500	147	5300	142	2100	56.3						
40	2.8	1600	42.9	3200	85.8	6600	177	5400	145	1300	34.8						
50	3.4	2100	56.3	3700	99.2	7200	193	5400	145								
60	4.1	2500	67.0	4600	123	7200	193	5400	145								
80	5.5	3200	85.8	5700	153	7200	193										
100	6.9			6300	169												
psig	bar	Body Size: NPS 2 / DN 50															
10	0.69	370	9.92	640	17.2	260	6.97	240	6.43	810	21.7						
15	1.0	670	18.0	1600	42.9	2400	64.3	4500	121	9400	252						
20	1.4	1000	26.8	1900	50.9	4100	110	6400	172	9400	252						
25	1.7	1100	29.5	2300	61.6	4900	131	8700	233	9400	252						
30	2.1	1300	34.8	2700	72.4	5700	153	8700	233	9400	252						
40	2.8	1400	37.5	3300	88.4	7500	201	8700	233	6700	180						
50	3.4	1800	48.2	3700	99.2	7800	209	8700	233								
60	4.1	2300	61.6	4400	118	7800	209	8800	236								
80	5.5	3100	83.1	5700	153												
100	6.9	3600	96.5	6800	182												
<div><div></div> Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.</div>																	
<div><div></div> Light Gray areas indicate limited capacities due to boost effects.</div>																	
<div><div></div> Dark Gray areas show where indicated droop would be exceeded regardless of capacity.</div>																	

Table 31. CP400 Series Internal Registration Flow Capacities for 7 psig / 0.48 bar Setpoint with 1% Pressure Factor Accuracy per Measurement Canada

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
7 psig	-0.22 psi	0.22 psi	5 to 10 psig	GE39890X012 / Black Stripe
0.48 bar	-15 mbar	15 mbar	0.34 to 0.69 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS											
Inlet Pressure		Orifice Size									
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Size: NPS 1-1/4 / DN 32									
15	1.0	720	19.3	490	13.1	2500	67.0	2500	67.0	7100	190
20	1.4	1000	26.8	1700	45.6	3800	102	4900	131	7100	190
25	1.7	1100	29.5	2300	61.6	5000	134	6700	180	7100	190
30	2.1	1300	34.8	2600	69.7	5200	139	7700	206	5300	142
40	2.8	1500	40.2	3100	83.1	5200	139	7700	206	4100	110
50	3.4	1900	50.9	3800	102	5200	139	7700	206		
60	4.1	2300	61.6	4500	121	5200	139	9900	265		
80	5.5	3000	80.4	5600	150	5600	150				
100	6.9	3800	102	7000	188						
125	8.6	4700	126								
psig	bar	Body Size: NPS 1-1/2 / DN 40									
15	1.0	690	18.5	1000	26.8	2900	77.7	4000	107	5600	150
20	1.4	1000	26.8	1900	50.9	4000	107	6200	166	5600	150
25	1.7	1100	29.5	2100	56.3	4900	131	6200	166	5600	150
30	2.1	1300	34.8	2500	67.0	5600	150	6200	166	5600	150
40	2.8	1700	45.6	3200	85.8	5700	153	6200	166	4300	115
50	3.4	2100	56.3	3800	102	5700	153	3900	105		
60	4.1	2400	64.3	4600	123	5700	153	3900	105		
80	5.5	3100	83.1	5700	153	5700	153				
100	6.9	3400	91.1	6900	185						
psig	bar	Body Size: NPS 2 / DN 50									
15	1.0	700	18.8	1100	29.5	370	9.92	110	2.95	870	23.3
20	1.4	1000	26.8	1900	50.9	2900	77.7	5800	155	8000	214
25	1.7	1200	32.2	2200	59.0	4900	131	8000	214	8000	214
30	2.1	1400	37.5	2600	69.7	5500	147	8600	230	8000	214
40	2.8	1700	45.6	3100	83.1	6900	185	8700	233	6600	177
50	3.4	2000	53.6	3300	88.4	8000	214	8700	233		
60	4.1	2500	67.0	4400	118	8800	236	8800	236		
80	5.5	2900	77.7	5600	150	8800	236				
100	6.9	3500	93.8	6700	180						
125	8.6	4500	121								
<div> <div></div> Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded. <div></div> Gray areas indicate limited capacities due to boost effects. </div>											

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Table 32. CP400 Series Internal Registration Flow Capacities for 10 psig / 0.69 bar Setpoint with 1% Pressure Factor Accuracy per Measurement Canada

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
10 psig	-0.25 psi	0.25 psi	5 to 10 psig	GE39890X012 / Black Stripe
0.69 bar	-17 mbar	17 mbar	0.34 to 0.69 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS											
Inlet Pressure		Orifice Size									
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Size: NPS 1-1/4 / DN 32									
15	1.0	410	11.0	670	18.0	2300	61.6	2400	64.3	80	2.14
20	1.4	880	23.6	1800	48.2	3000	80.4	5300	142	7400	198
25	1.7	1100	29.5	2400	64.3	5000	134	7100	190	7400	198
30	2.1	1300	34.8	2600	69.7	5700	153	7100	190	7400	198
40	2.8	1700	45.6	3100	83.1	7100	190	7100	190	6600	177
50	3.4	2100	56.3	3800	102	7100	190	7100	190		
60	4.1	2400	64.3	4500	121	7100	190	7500	201		
80	5.5	3200	85.8	5200	139	4900	131				
100	6.9	3900	105	5200	139						
125	8.6	4600	123	5200	139						
psig	bar	Body Size: NPS 1-1/2 / DN 40									
15	1.0					1600	42.9	1100	29.5	730	19.6
20	1.4	940	25.2	1500	40.2	3800	102	4200	113	5400	145
25	1.7	1200	32.2	2200	59.0	4700	126	5400	145	5400	145
30	2.1	1400	37.5	2500	67.0	5400	145	5400	145	5400	145
40	2.8	1800	48.2	3300	88.4	5400	145	5400	145	5400	145
50	3.4	2100	56.3	3900	105	5400	145	5400	145		
60	4.1	2500	67.0	4500	121	5400	145	5100	137		
80	5.5	3200	85.8	5400	145	5400	145				
100	6.9	3900	105	5600	150						
125	8.6	4600	123								
psig	bar	Body Size: NPS 2 / DN 50									
15	1.0					2400	64.3	3500	93.8	400	10.7
20	1.4	460	12.3	1600	42.9	3100	83.1	3500	93.8	9500	255
25	1.7	800	21.4	2300	61.6	5400	145	6300	169	9500	255
30	2.1	1100	29.5	2800	75.0	5900	158	8800	236	9500	255
40	2.8	1400	37.5	2800	75.0	7600	204	9700	260	7000	188
50	3.4	1900	50.9	3800	102	9200	247	9700	260		
60	4.1	1900	50.9	4600	123	9200	247	9700	260		
80	5.5	2800	75.0	5600	150	9200	247				
100	6.9			7000	188						

Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.
 Light Gray areas indicate limited capacities due to boost effects.
 Dark Gray areas show where indicated droop would be exceeded regardless of capacity.

Table 33. CP400 Series Internal Registration Flow Capacities for 15 psig / 1.0 bar Setpoint with 1% Pressure Factor Accuracy per Measurement Canada

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
15 psig	-0.30 psi	0.30 psi	10 to 20 psig	GE30200X012 / Purple Stripe
1.0 bar	-20 mbar	20 mbar	0.69 to 1.4 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS											
Inlet Pressure		Orifice Size									
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		3/4 In. / 19 mm	
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
psig	bar	Body Size: NPS 1-1/4 / DN 32									
20	1.4					260	6.97	800	21.4	2300	61.6
25	1.7					3300	88.4	5000	134	9700	260
30	2.1	1500	40.2	2300	61.6	4500	121	7200	193	9700	260
40	2.8	1900	50.9	2800	75.0	6600	177	9400	252	2600	69.7
50	3.4	2200	59.0	3400	91.1	3700	99.2	400	10.7		
60	4.1	2600	69.7	4000	107	2100	56.3	310	8.31		
80	5.5	3300	88.4	5300	142	2100	56.3				
100	6.9	4000	107	6600	177						
125	8.6	4900	131	7500	201						
psig	bar	Body Size: NPS 1-1/2 / DN 40									
20	1.4					310	8.31	340	9.11	2200	59.0
25	1.7					1200	32.2	1000	26.8	3500	93.8
30	2.1	1500	40.2	2400	64.3	4900	131	5800	155	5800	155
40	2.8	1900	50.9	3100	83.1	5800	155	5800	155	4100	110
50	3.4	2300	61.6	3800	102	1100	29.5	5800	155		
60	4.1	2600	69.7	4500	121	1100	29.5	4700	126		
80	5.5	3300	88.4	5600	150	1100	29.5				
100	6.9	4000	107	6500	174						
125	8.6	4800	129	6500	174						
psig	bar	Body Size: NPS 2 / DN 50									
20	1.4					2700	72.4	1400	37.5	320	8.58
25	1.7					1100	29.5	860	23.0	4700	126
30	2.1	1400	37.5	2400	64.3	5600	150	8300	222	8200	220
40	2.8	1800	48.2	3200	85.8	7200	193	8300	222	8200	220
50	3.4	2200	59.0	3700	99.2	7200	193	3800	102		
60	4.1	2600	69.7	4400	118	7200	193	3800	102		
80	5.5	3300	88.4	5800	155	7200	193				
100	6.9	3800	102	6900	185						
125	8.6	4800	129	8500	228						
<div><div></div> Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.</div>											
<div><div></div> Light Gray areas indicate limited capacities due to boost effects.</div>											
<div><div></div> Dark Gray areas show where indicated droop would be exceeded regardless of capacity.</div>											

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Table 34. CP400 Series Internal Registration Flow Capacities for 20 psig / 1.4 bar Setpoint with 1% Pressure Factor Accuracy per Measurement Canada

	ACCURACY			
SETPOINT	+ / - 1% ABS		SET RANGE	PART NUMBER / COLOR
20 psig	-0.35 psi	0.35 psi	10 to 20 psig	GE30200X012 / Purple Stripe
1.4 bar	-24 mbar	24 mbar	0.69 to 1.4 bar	

CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS												
Inlet Pressure		Orifice Size										
		3/16 In. / 4.8 mm		1/4 In. / 6.4 mm		3/8 In. / 9.5 mm		1/2 In. / 13 mm		3/4 In. / 19 mm		
		SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	
psig	bar	Body Size: NPS 1-1/4 / DN 32										
25	1.7								1500	40.2	3900	105
30	2.1	1300	34.8	2300	61.6			5400	145	8800	236	
40	2.8	1800	48.2	3400	91.1	5700	153	5400	145			
50	3.4	2200	59.0	4000	107	7300	196	4400	118			
60	4.1	2600	69.7	4600	123	9900	265	3300	88.4			
80	5.5	3200	85.8	5900	158	9900	265					
100	6.9	4000	107	7200	193							
psig	bar	Body Size: NPS 1-1/2 / DN 40										
25	1.7			1000	26.8	1600	42.9	540	14.5	1100	29.5	
30	2.1	1000	26.8	2000	53.6	4200	113	5900	158	5900	158	
40	2.8	1700	45.6	3200	85.8	5500	147	5900	158	5900	158	
50	3.4	2200	59.0	3900	105	5500	147	5900	158			
60	4.1	2400	64.3	4700	126	5500	147	6400	172			
80	5.5	3200	85.8	6000	161	5500	147					
100	6.9	3800	102	7200	193							
125	8.6	4600	123	8000	214							
psig	bar	Body Size: NPS 2 / DN 50										
25	1.7						110	2.95	1100	29.5	1500	40.2
30	2.1	730	19.6	1700	45.6	4000	107	6400	172	9600	257	
40	2.8	1600	42.9	2900	77.7	6700	180	8900	239	9600	257	
50	3.4	2000	53.6	3800	102	8700	233	8900	239			
60	4.1	2300	61.6	4200	113	8900	239	8900	239			
80	5.5	3200	85.8	5500	147	9900	265					
100	6.9	3800	102	6900	185							
125	8.6	4800	129	8300	222							
<div><div></div> Blank areas indicate where maximum operating inlet pressure for a given orifice size is exceeded.</div> <div><div></div> Light Gray areas indicate limited capacities due to boost effects.</div> <div><div></div> Dark Gray areas show where indicated droop would be exceeded regardless of capacity.</div>												

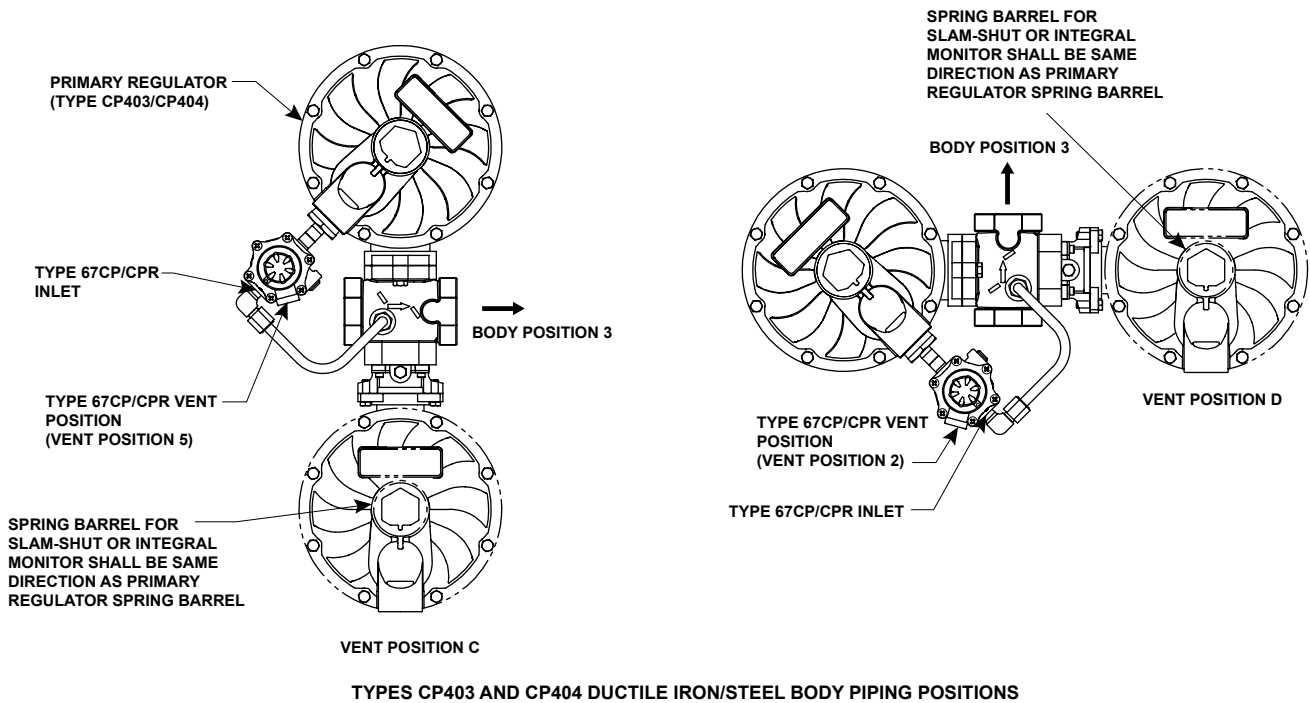
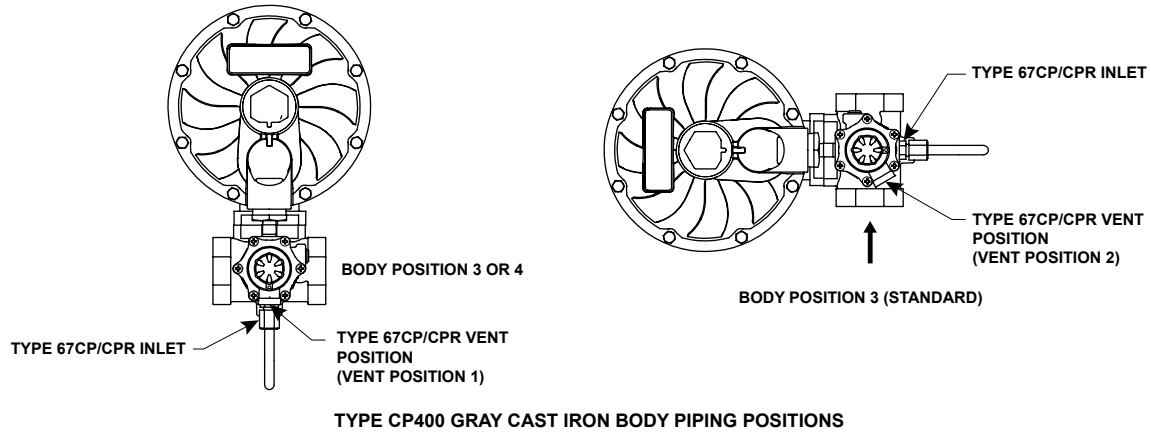


Figure 7. CP400 Series Vent and Body Orientation

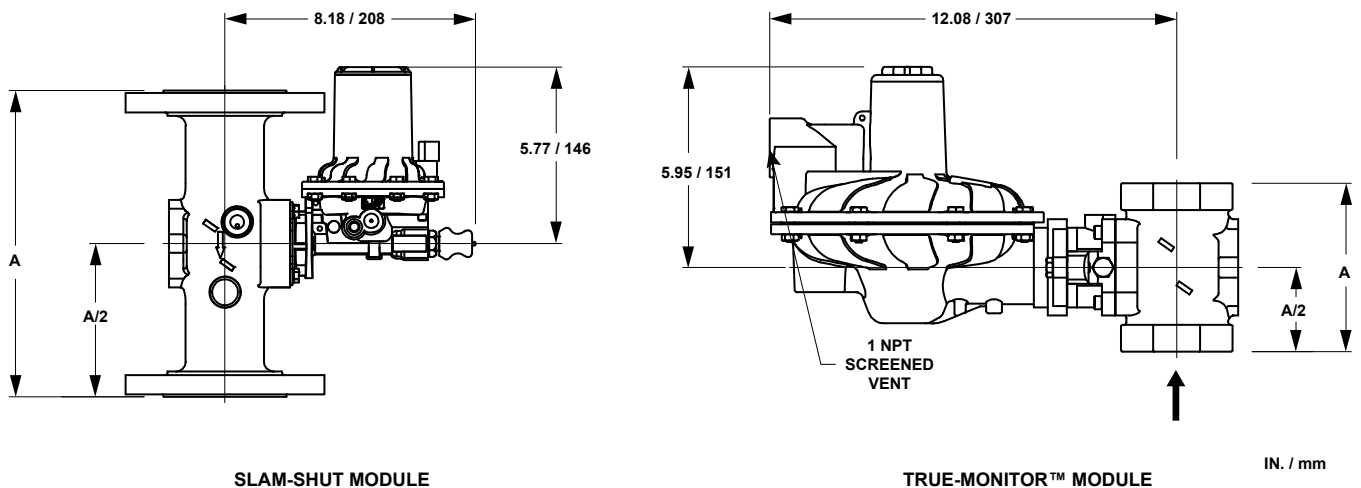
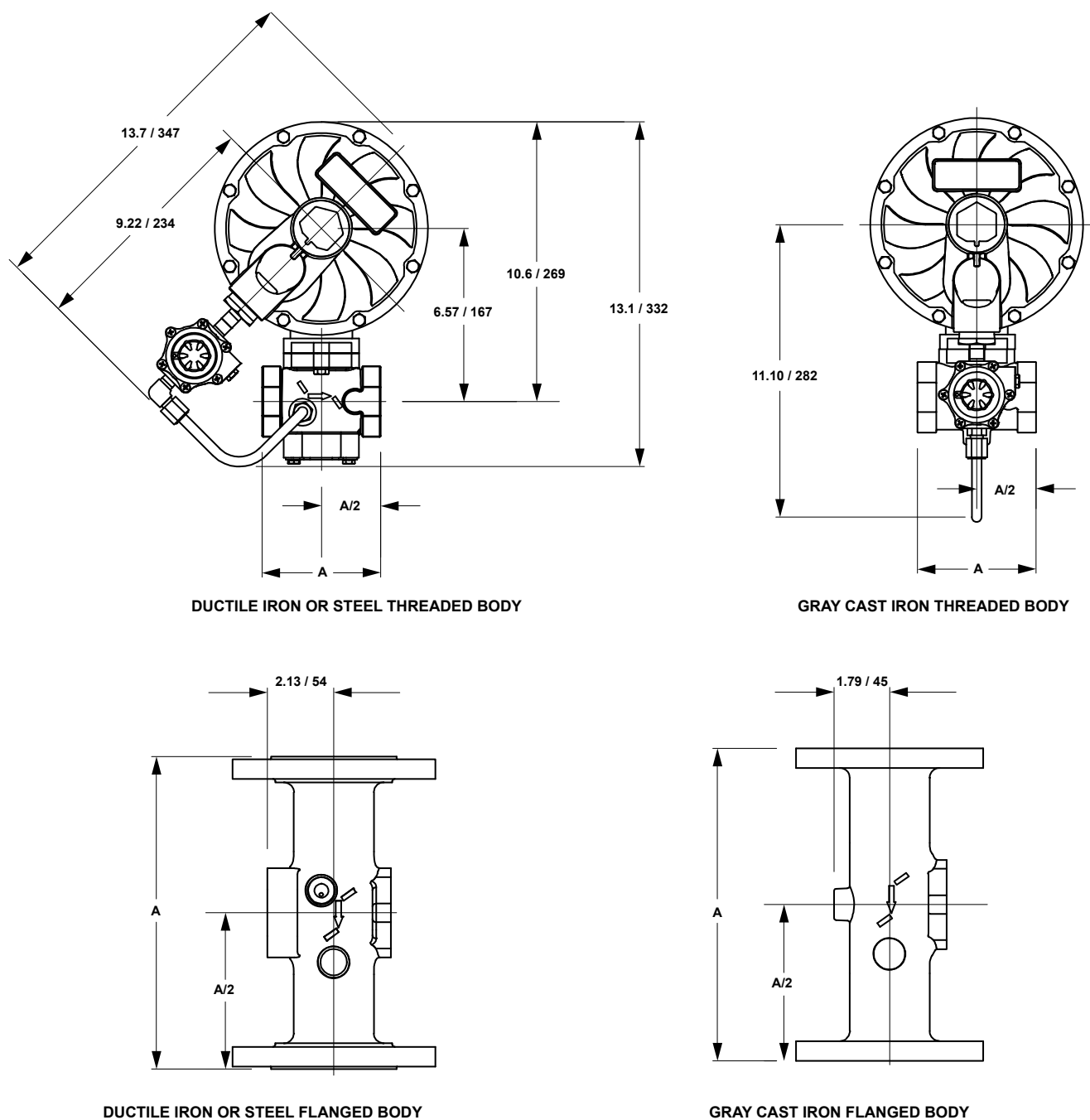


Figure 8. Dimensions



IN. / mm

Figure 8. Dimensions (continued)

Table 35. Dimensions

BODY SIZE	END CONNECTION STYLES, IN. / mm	
	A	
	NPT / Rp	CL125 FF / CL150 FF / PN 16
1-1/4	4.49 / 114	----
1-1/2		----
1	3.94 / 100	----
NPS 2 / DN 50	5 / 127	10 / 254

Ordering Guide

Type (Select One)

Regulator with Internal Registration

- ☐ CP400IN***
- ☐ CP400IT (with token relief)***

Regulator with External Registration

- ☐ CP400EN***
- ☐ CP400ET (with token relief)***

Regulator with Internal Registration and Integral True-Monitor™ Protection

- ☐ CP403IN***
- ☐ CP403IT (with token relief)***

Regulator with External Registration and Integral True-Monitor Protection

- ☐ CP403EN***
- ☐ CP403ET (with token relief)***

Regulator with Internal Registration and Integral Type VSX4 Slam-shut module

- ☐ CP404IN***
- ☐ CP404IT (with token relief)***

Regulator with External Registration and Integral Type VSX4 Slam-shut module

- ☐ CP404EN***
- ☐ CP404ET (with token relief)***

Body Size, Material and End Connection (Select One)

Gray Cast Iron (All Types)

- ☐ 1-1/4 NPT***
- ☐ 1-1/2 NPT***
- ☐ 2 NPT***
- ☐ NPS 2 / DN 50, CL125 FF
[10 in. / 254 mm Face-to-Face]***

Ductile Iron (All Types)

- ☐ 1-1/4 NPT***
- ☐ 1-1/2 NPT***
- ☐ 2 NPT***
- ☐ Rp 1-1/4***
- ☐ Rp 1-1/2***
- ☐ Rp 2***
- ☐ NPS 2 / DN 50, CL150 FF
[10 in. / 254 mm Face-to-Face]***
- ☐ NPS 2 / DN 50, PN 10/16
[10 in. / 254 mm Face-to-Face]***

Steel (All Types)

- ☐ 1-1/4 NPT***
- ☐ 1-1/2 NPT***
- ☐ Rp 1-1/4***
- ☐ Rp 1-1/2***

Outlet Pressure Range (Select One)

- ☐ 1 to 2 psig / 0.07 to 0.14 bar***
- ☐ 2 to 5 psig / 0.14 to 0.34 bar***
- ☐ 5 to 10 psig / 0.34 to 0.69 bar***
- ☐ 10 to 20 psig / 0.69 to 1.4 bar***

Orifice Size (Select One)

- ☐ 3/16 in. / 4.8 mm***
- ☐ 1/4 in. / 6.4 mm***
- ☐ 3/8 in. / 9.5 mm***
- ☐ 1/2 in. / 13 mm***
- ☐ 5/8 in. / 16 mm***
- ☐ 3/4 in. / 19 mm***

Body Orientation (Select One)

Type CP400

- ☐ Position 3 (standard)***
- ☐ Position 4*** (only available on Type CP400 with Gray Cast Iron Body)

Vent Orientation of Type 67CP/67CPR and CP400 Series with Gray Cast Iron Body

(Select One)

- ☐ Position 1 (standard)***
- ☐ Position 2***

Type CP403/CP404 and CP400 Series with Ductile or Steel Body (Select One)

- ☐ Position 2***
- ☐ Position 5 (standard)***

Certification (Available only on CP400 Series Construction)

- ☐ Pressure Factor Measurement (PFM)

True-Monitor Control Pressure Range (Select One)

CP403 Series

- ☐ 1.4 to 2.9 psig / 97 to 200 mbar, Black⁽¹⁾
- ☐ 2.6 to 3.7 psig / 179 to 255 mbar, Purple⁽¹⁾
- ☐ 3.6 to 6 psig / 248 to 414 mbar, Dark Blue
- ☐ 5.1 to 7.5 psig / 352 to 517 mbar, Red

Slam-Shut Trip Pressure Setting

Types VSX4L and VSX4H

- ☐ Overpressure (OPSO) trip only
(supply high-pressure trip pressure)
Indicate trip pressure **See Table 8**
- ☐ Over and Underpressure (OPSO/UPSO) trip
(supply high and low pressure trip pressure)
Indicate trip points **See Table 9**
Over _____ Under _____

1. Available with CP403 Series without Token relief only.

Ordering Guide (continued)

Regulators Quick Order Guide	
***	Readily Available for Shipment
**	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Specification Worksheet
Application: Specific Use _____ Line Size _____ Gas Type and Specific Gravity _____ Gas Temperature _____ Does the Application Require Overpressure Protection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, which is preferred: <input type="checkbox"/> Relief Valve <input type="checkbox"/> Monitor Regulator <input type="checkbox"/> Shutoff Device Is overpressure protection equipment selection assistance desired? _____
Pressure: Maximum Inlet Pressure (P_{1max}) _____ Minimum Inlet Pressure (P_{1min}) _____ Downstream Pressure Setting(s) (P_2) _____ Maximum Flow (Q_{max}) _____
Performance Required: Accuracy Requirements? _____ Need for Fast Response? _____
Other Requirements: _____

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